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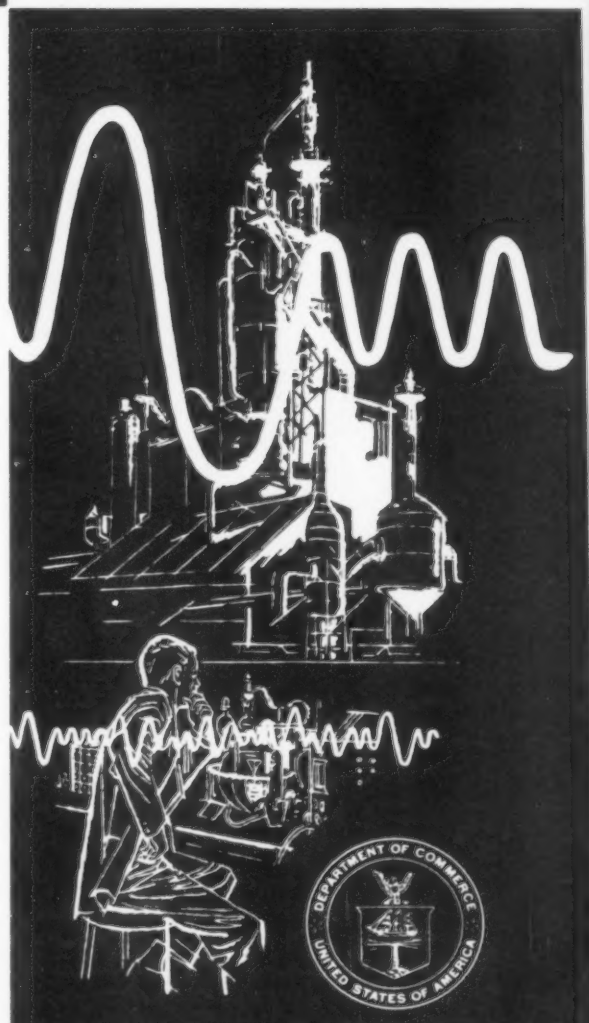

U. S. DEPARTMENT OF COMMERCE

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Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
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*AUXILIARY POWER PLANTS
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*COAXIAL CABLES
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ELECTRON BEAM WELDING OF TI ALLOYS AND STEELS: EFFECT OF POST HEATING ON STRAIN AND IMPACT RESISTANCE: CORRELATION BETWEEN STEEL GASEOUS CONTENT AND IMPACT RESISTANCE.
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***TRAINING**

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***TRAINING MACHINES**

RUSSIAN ARTICLE ON CYBERNETIC TRAINING.
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TRAINING, UTILIZATION AND PROFICIENCY OF NAVY ELECTRONICS TECHNICIANS. III. PROFICIENCY IN THE USE OF TEST EQUIPMENT.
AD-294 550 DIV. 23

***TRANSFER OF TRAINING**

RESEARCH ON AUGMENTED FEEDBACK AND THE ACQUISITION AND TRANSFER OF SKILL.
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***TRANSFORMATIONS (MATHEMATICS) LINEAR PROGRAMMING**

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***TRANSFORMATIONS (MATHEMATICS) PROGRAMMING**

COORDINATE TRANSFORMATION FORMULAS AND DERIVATIONS.
AD-294 311 DIV. 15

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AD-294 314 DIV. 8

TEMPERATURE AND POWER DISSIPATION STRESSES ON SILICON POWER TRANSISTORS. EXTENDED LIFE TEST PROGRAM ON TYPE 2N1484 AT THE 8000 HR INTERVAL AND TYPES 2N1480 AND 2N1488 AT THE 1000 HR INTERVAL.
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***TRANSISTORS THIN FILMS**

A PROCESS FOR DEPOSITING DEVICE-QUALITY SILICON AND/OR GERMANIUM FILMS ON POLYCRYSTALLINE INSULATING SUBSTRATES BY VACUUM EVAPORATION OF SILICON AND/OR GERMANIUM. FORMATION OF DIODES AND TRANSISTORS.
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***TRANSITION TEMPERATURE CALORIMETERS**

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***TRANSITION TEMPERATURE MECHANICAL PROPERTIES**

EFFECT OF METALLURGICAL VARIABLES IN SHIP-PLATE STEELS ON TRANSITION TEMPERATURES IN CHARPY V-NOTCH TESTS.
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***TRANSLATIONS THEORY**

DESCRIBES A SYNTAX-DIRECTED TRANSLATOR FOR IMPROVED COMPUTER APPLICATION.
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A NUMERICAL TECHNIQUE FOR DETERMINING THE EFFICIENCY OF POWER TRANSMISSION ON A RF LINE BETWEEN A SOURCE OF POWER AND A DRAIN.
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AD-293 807 DIV. 8

***TRANSMISSION LINES SUBMARINES**

IMPROVED BROADBAND, LOW-LOSS TRANSMISSION LINE SYSTEM TO BE INSTALLED WITHIN A RETRACTABLE SUBMARINE MAST.
AD-294 032 DIV. 8

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AD-293 849 DIV. 7

***TRANSPORTATION CONTROL SYSTEMS**

STUDY OF TRAFFIC FLOW AS A MEANS TO INCREASE UTILITY OF FREEWAYS.
AD-294 581 DIV. 33

***TRAVELING WAVE TUBES X BAND**

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AD-294 795 DIV. 8

***TUNGSTEN BRAZING**

BRAZING ALLOY SYSTEMS FOR NB AND MO IMPROVEMENT OF # ALLOY DUCTILITY; DIFFUSION BONDING IN WELDED JOINTS.
AD-294 681 DIV. 17

***TUNGSTEN POWDER METALLURGY**

PHYSICAL PROPERTIES OF TUNGSTEN AND TUNGSTEN ALLOYS OBTAINED BY VARYING METALLURGICAL PROCESSES.
AD-293 841 DIV. 17

***TUNGSTEN ZONE MELTING**

FLOW AND FRACTURE OF ZONE REFINED TUNGSTEN. BRITTLE DUCTILE TRANSITION AND DEFORMATION MODES. ELECTRON BEAM COMPARED TO INDUCTION MELTING TECHNIQUES FOR PURIFYING W. INDUCTION TYPE ZONE MELTER.
AD-293 877 DIV. 17

***TUNGSTEN ALLOYS BRAZING**

BRAZING ALLOY SYSTEMS FOR NB AND MO IMPROVEMENT OF # ALLOY DUCTILITY; DIFFUSION BONDING IN WELDED JOINTS.
AD-294 681 DIV. 17

***TUNGSTEN ALLOYS SHEETS**

POLYMOLYBDENUM- AND TUNGSTEN-BASE ALLOY SHEET MATERIALS. PREPARATION AND PROPERTIES OF INGOTS. EXTRUSION STUDIES. ROLLING TO SHEET. MECHANICAL AND METALLURGICAL PROPERTIES OF SHEET STOCK.
AD-294 979 DIV. 17

***TUNGSTEN ALLOYS SINTERING**

PREPARATION OF A POWDER-METALLURGY CO-W ALLOY FOR INSTRUMENT MAKING; SINTERING TECHNIQUES AND PHASE STUDIES.
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AD-294 721 DIV. 25

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HANDBOOK ON COMPOSING MATHEMATICAL EXPRESSIONS ON A TYPEWRITER.
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ULTRASONIC WELDING OF MO-0.5TI ALLOY FOIL; TENSILE-SHEAR STRENGTH DATA.
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AD-294 193 DIV. 25

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AD-294 193 DIV. 25

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UNDERWATER SOUND REVERBERATION (A SURVEY REPORT AND BIBLIOGRAPHY).
AD-294 540 DIV. 6

***UPPER ATMOSPHERE INSTRUMENTATION**

DEVELOPMENT AND TESTING OF A ROCKET-BORNE INFRARED HYGROMETER FOR THE MEASUREMENT OF WATER VAPOR IN THE UPPER ATMOSPHERE.
AD-294 893 DIV. 2

***UPPER ATMOSPHERE PHYSICS**

RESEARCH ON PHYSICS OF THE UPPER ATMOSPHERE. FUNDAMENTAL QUANTAL CALCULATIONS. COLLISION PROCESSES. ATOMIC STRUCTURAL PROBLEMS.
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USSR ARTICLES ON VARIOUS MEDICO-BIOLOGICAL INVESTIGATIONS IN SPACE FLIGHT.
AD-294 530 DIV. 16

FIRST MANNED SPACE FLIGHTS; A MEDICAL AND BIOLOGICAL INVESTIGATION. SCIENTIFIC RESULTS CONDUCTED DURING THE ORBITAL FLIGHTS OF THE SPACESHIPS VOSTOK AND VOSTOK-2.
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AD-294 526 DIV. 11

***VACUUM SYSTEMS HIGH TEMPERATURE RESEARCH**

FORMATION OF THIN FILMS OF SEMICONDUCTORS. DEVELOPMENT OF METHODS FOR MINIMIZING CRYSTAL DEFECTS. DEPOSITION OF SINGLE CRYSTALS. X-RAY DIFFRACTION STUDIES OF CRYSTALS.
AD-294 491 DIV. 25

***VALVES BLAST**

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AD-294 699 DIV. 8

***VEHICLE TRACKS**

VEHICLE EVALUATIONS IN SUBARCTIC ENVIRONMENT. ALASKA.
AD-294 409 DIV. 11

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AD-294 909 DIV. 25

*VIBRATION MECHANISMS
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NUMERICAL ANALYSIS OF LIGHTWEIGHT INERTIAL GUIDANCE SYSTEM. APPENDICES TO AD 333 959.
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VISCOSITY OF N2, HE, NE, AND AR FROM -79.5 TO 100 C BELOW 200 ATMOSPHERES. DEVELOPMENT OF A NEW CAPILLARY-FLOW VISCOMETER IS REPORTED FOR MEASUREMENT OF THE ABSOLUTE VISCOSITY OF GASES AS A FUNCTION OF TEMPERATURE AND PRESSURE.
AD-294 401 DIV. 25

*VISCOSITY

VISCOSITY OF N2, HE, NE, AND AR FROM -79.5 TO 100 C BELOW 200 ATMOSPHERES. DEVELOPMENT OF A NEW CAPILLARY-FLOW VISCOMETER IS REPORTED FOR MEASUREMENT OF THE ABSOLUTE VISCOSITY OF GASES AS A FUNCTION OF TEMPERATURE AND PRESSURE.
AD-294 401 DIV. 25

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AD-294 422 DIV. 8

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AD-294 635 DIV. 14

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*VISUAL SIGNALS
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*WATER

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AD-294 595 DIV. 16

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*WATER VAPOR
MEASUREMENT

DEVELOPMENT AND TESTING OF A ROCKET-BORNE INFRARED HYGROMETER FOR THE MEASUREMENT OF WATER VAPOR IN THE UPPER ATMOSPHERE.
AD-294 833 DIV. 2

*WAVE CHARACTERISTICS
MECHANICAL PROPERTIES

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AD-294 312 DIV. 25

*WAVE CHARACTERISTICS
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WAVE PROPAGATION IN A TWO-LAYERED MEDIUM.
AD-294 858 DIV. 25

*WAVE TRANSMISSION

PLASMA PROPERTIES ARE STUDIED BY MEANS OF MEASURING TIME PROFILES OF CONDUCTIVITY IN AN ELECTRIC DISCHARGE TUBE.
AD-294 485 DIV. 4

*WAVE TRANSMISSION
AMPLIFIERS

A METHOD OF AMPLIFYING ELECTROMAGNETIC RADIATIONS OF ULTRAVIOLET, VISIBLE, INFRARED, AND RADIO WAVE RANGE RADIATIONS.
AD-294 510 DIV. 25

*WAVEGUIDES

SYMMETRIES OF UNIFORM WAVEGUIDE CONTAINING ANISOTROPIC MATERIALS.
AD-293 952 DIV. 8

SCATTERING OF ELECTROMAGNETIC WAVES BY A FERRITE SLAB IN WAVEGUIDE. THE KATO METHOD FOR OBTAINING RIGOROUS UPPER AND LOWER BOUNDS ON THE PHASE SHIFT IN A SINGLE CHANNEL SCATTERING PROBLEM IS EXTENDED FOR THIS APPLICATION.
AD-294 100 DIV. 8

*WAVEGUIDES
DESIGN

PROTOTYPE HIGH POWER CIRCULATOR. MODIFICATION OF THE UHF Y-CIRCULATOR FOR MOUNTING IN A STANDARD 19 INCH RELAY RACK.
AD-294 929 DIV. 9

*WAVEGUIDES
SUBMARINE ANTENNAS

IMPROVED BROADBAND, LOW-LOSS TRANSMISSION LINE SYSTEM TO BE INSTALLED WITHIN A RETRACTABLE SUBMARINE MAST.
AD-294 032 DIV. 5

*WEATHER FORECASTING
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AD-294 796 DIV. 2

*WEATHER FORECASTING
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INSTRUMENTATION AND TECHNIQUES FOR ARMY WEATHER OBSERVATION.
AD-294 682 DIV. 28

*WEIGHTLESSNESS
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BIBLIOGRAPHY ON PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF SPACE FLIGHT SPECIFIC TO WEIGHTLESSNESS AND SUBGRAVITY.
AD-293 935 DIV. 16

*WELDING
ELECTRON BEAMS

ELECTRON BEAM WELDING OF TI ALLOYS AND STEELS; EFFECT OF POST HEATING ON STRAIN AND IMPACT RESISTANCE; CORRELATION BETWEEN STEEL GASEOUS CONTENT AND IMPACT RESISTANCE.
AD-294 585 DIV. 26

*WELDING
ULTRASONICS

ULTRASONIC WELDING OF MO-0.5TI ALLOY FOIL; TENSILE-SHEAR STRENGTH DATA.
AD-294 591 DIV. 26

*WET CELLS
DESIGN

THIN-PLATE BATTERY PORTION OF MOLECULAR CIRCUIT DEVELOPMENT. DESIGN AND FABRICATION OF SIX 10-VOLT, 3-AMP, BATTERY-CELL PACK ASSEMBLIES AND FURTHER IMPROVEMENT FOR SINGLE CELL PERFORMANCE. METHODS OF CATHODE MATRIX PREPARATION.
AD-294 883 DIV. 9

*WIND
CLIMATIC FACTORS

TIME CHANGES IN A TEMPERATE LATITUDE CLOUD AND WEATHER SYSTEM AS REVEALED BY METEOROLOGICAL SATELLITE DATA.
AD-294 810 DIV. 2

*WIND
EUROPE

DESCRIPTION OF CLIMATOLOGY OF THE ATMOSPHERE IN EASTERN EUROPE.
AD-294 426 DIV. 2

*WIND
SHEAR STRESSES

A CASE-STUDY OF THUNDERSTORMS ON AN OCCASION OF SMALL WIND SHEAR. AN ANALYSIS IS MADE OF EXTENSIVE RADAR AND OTHER OBSERVATIONS OF STORMS OVER SOUTHERN ENGLAND.
AD-293 919 DIV. 2

*WING-BODY CONFIGURATIONS
HYPERSONICS

EXPERIMENTAL AND THEORETICAL INVESTIGATION OF SECOND-ORDER WING-BODY INTERFERENCE AT MACH 7.35.
AD-294 411 DIV. 9

*ZINC

AG-ZN SECONDARY BATTERIES; ABSORPTION OF H2 BY PD-TREATED AG POSITIVE PLATES; CURRENT DENSITY AND KOH STUDIES ON CYCLE LIFE; EXPANDER STUDIES AND H2 EVOLUTION STUDIES.
AD-294 358 DIV. 7

*ZINC COMPOUNDS

PARAMAGNETIC RESONANCE SPECTRUM OF DIVALENT IRON IN ZINC FLUOSILICATE; ELECTRON SPIN RESONANCE SPECTRUM.
AD-293 848 DIV. 25

*ZONE MELTING

FLOW AND FRACTURE OF ZONE REFINED TUNGSTEN. BRITTLE DUCTILE TRANSITION AND DEFORMATION MODES. ELECTRON BEAM COMPARED TO INDUCTION MELTING TECHNIQUES FOR PURIFYING W. INDUCTION TYPE ZONE MELTER.
AD-293 877 DIV. 17

ZONE MELTING OF KCL. KCL CRYSTALS OF PURITY SUPERIOR TO THAT WHICH IS COMMERCIALLY AVAILABLE CAN BE PRODUCED BY REPRODUCIBLE ZONE REFINING PROCEDURES.
AD-294 013 DIV. 25

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-293 804 Div. 1
(TISTA/GEC) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
LAUNCHING SET, BALLOON AN/TMQ-12(XD-2).
Test rept. on Category 1 and 2.
Nov 62, 24p. incl. tables.
(ESD TDR 63-118) Unclassified report

DESCRIPTORS: *Balloons, *Meteorological balloons, Hydrogen, Gas generating systems, Design, Effectiveness, Tests, Maintenance, Balloon launchers.

The Launching Set, Balloon AN/TMQ-12, was developed to provide both a mobile H2 generating capability for inflating rawinsonde balloons and a balloon launching capability. The launching mechanism provides housing for the balloon during the inflation process. On balloon release, it provides a free escape path, minimizing the possibility of balloon abrasion and damage. The equipment provides improved balloon handling techniques under high wind conditions at mobile rawinsonde sites. (Author)

AD-293 857 Div. 1
(TISTA/GEC) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
DESIGN AND FEASIBILITY TESTING OF AN EXPLOSIVE FLIGHT TERMINATION DEVICE FOR THE F9F AERIAL TARGET,
by John S. Ward. Dec 62, 13p. incl. illus.
2 refs. (Rept. no. NOTS TP 3099)
(NAVWEPS rept. no. 8078) Unclassified report

DESCRIPTORS: *Jet fighters, *Control systems, Flight testing, Naval aircraft, Design, Wings, Failure(Mechanics), Effectiveness, Reliability, Feasibility studies, Target drones, Destructors.

The design and feasibility testing of a flight-termination device containing a minimum explosive charge are described. The philosophy of the device is to destroy the structural integrity of the wing on one side of an aircraft by cutting the main wing spar, thereby causing the aircraft to spin down to earth in a relatively predictable area. The device, containing an 8.2-lb explosive charge, was tested on a wrecked Navy F9F aircraft and proved to be even more effective than anticipated. (Author)

AD-294 015 Div. 1
(TISTA/GEC) OTS price $3.60

Air Photographic and Charting Service, Military Air Transport Service, Orlando Air Force Base, Fla.
REQUIRED PARAMETERS OF AN OPTICAL AZIMUTH DETERMINATION SYSTEM,
by Paul E. Needham. Nov 62, 26p. incl. illus. tables, 5 refs. (APCS Operations study 62-6)
Unclassified report

DESCRIPTORS: *Beacon lights, *Azimuth, Optical systems, Aircraft equipment, Mapping, Military requirements, Airborne, Determination.

An airborne light for use in determining azimuths over long lines will be included as part of the aircraft equipment in the AN/USQ-28 Mapping and Surveying Sub-System. The technique is described for long line azimuth determination and the parameters for an airborne optical beacon are outlined. (Author)

AD-294 106 Div. 1
(TISTA/GEC) OTS price $3.60

North American Aviation, Inc, Los Angeles, Calif.
ANALYSIS OF MECHANICAL SERVO DRIVE CONCEPT APPLIED TO FLIGHT CONTROLS.
Interim rept. no. 1, 2 July-29 Sep 62.
29 Sep 62, 1v. incl. illus. tables (Rept. no. NA 62-1105)
(Contract NOw 62-1076d)
Unclassified report

DESCRIPTORS: *Ailerons, Servomechanisms, Servo systems, Theory, Design, Analog computers, Simulation, Jet fighters, Control systems.

Investigation of an all mechanical aileron control system including a mechanical proportional toroidal servo is described. A system having specified characteristics will provide satisfactory performance and this system is deemed feasible within present state of the art component development. Analog representations and results of system parameter variation studies are presented. Schematics, system and servo characteristics, and pictorial reproductions are contained. (Author)

AD-294 107 Div. 1
(TISTA/GEC) OTS price $1.60

North American Aviation, Inc., Los Angeles, Calif.
EVALUATION OF A MECHANICAL FLIGHT CONTROL SERVO.
Interim rept. no. 2, 1 Oct-30 Nov 62.
30 Nov 62, 1v. incl. illus. (Rept. no. NA 62-1415)
(Contract NOw 62-1076-d)
Unclassified report

DESCRIPTORS: *Ailerons, Servomechanisms, Servo systems, Flight simulators, Design, Feedback, Specifications, Control systems.

Continuation of the investigation of an all mechanical proportional toroidal servo including the formulation of procurement definition, design of an adaptation to an existing F100 simulator all mechanical aileron control system, and specific procurement commitment are described. (Author)

AD-294 189 Div. 1
(TISTA/GEC) OTS price $8.60

Western Electro-Acoustic Lab., Inc., Los Angeles, Calif.
ACOUSTICAL EVALUATION OF TYPE II AIRCRAFT GROUND

Division 1 - AIRCRAFT AND FLIGHT EQUIPMENT

RUNUP NOISE SUPPRESSOR AT TRUAX AIR FORCE BASE, WISCONSIN,
by Kenneth M. Eldred. Dec 62, 86p. incl. illus. tables.
(Contract AF 33(616)5744, Proj. 7210)
(AMRL memo. M-22)
Unclassified report

DESCRIPTORS: *Jet engine noise, Reduction, Acoustics, Jet fighters, Exhaust diffusers, Measurement, Design, Suppressors.

Acoustical evaluations were made of the Type II aircraft ground runup noise suppressors. The evaluations provide comparison of performance with and without installation of a diffusion screen in the exhaust stream. A description is presented of the suppressor's reduction of the noise radiated by the aircraft to the far field, and the change in the noise environment for maintenance personnel resulting from enclosing the aircraft. The noise environment in the suppressor's control and utility rooms during aircraft runup is described. The computed transmission loss is reported for the walls and doors and an estimate of the relative contributions of each noise transmission path to the suppressor's far field noise is included. (Author)

AD-294 372 Div. 1, 8, 19, 23, 30
(TISTE/OHD) OTS price $4.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
ANIP CONTACT ANALOG GENERATOR.
Final rept. on Phase III.
Dec 62, 44p. incl. illus. tables (Rept. no. DAC 59-901)
(In cooperation with Douglas Aircraft Co., Contract Nonr-107600)
Unclassified report

DESCRIPTORS: *Flight simulators, *Ground position indicators, *Flight paths, Digital computers, Color television, Video signals, Analog computers, Mathematical analysis.

A new digital stored-pattern ground-plane generator is described. This machine differs from previous designs in that it is entirely a digital computer which generates the video and synchronization signals for a standard color or monochrome TV monitor. Further it incorporates a stored texture pattern which is composed of three nested patterns and which may be programmed by the user. A ground-stabilized flight-path generator which would be an extension of the flight-path generator is described. The ground plane generator was demonstrated with an aircraft flight simulator and cockpit mockup. The cockpit mockup contained a color TV display, a stick, a throttle, and an airspeed indicator. The simulator provided the outputs for the ground plane generator and thus allowed the display to be flown both as a flight instrument and as a visual attachment for an aircraft simulator. In addition to the aircraft dynamic equations of motion, the following characteristics were also included in the simulator: engine lag, engine and wind noise, ground steering, wheel brakes, tire squeak at touchdown. (Author)

AD-294 393 Div. 1, 33
(TISTA/GEC) OTS price $11.00

Stanford Research Inst., Menlo Park, Calif.
USE OF MINIMUM TIME TRACK DATA IN AIRWAYS DESIGN OF LONG RANGE AND OVER-OCEAN ROUTES.
Final rept. 1955-1960,
by Sidney M. Serebreny, Eldon J. Wiegman and Rex G. Hadfield. Sep 62, 139p. incl. illus. tables.
(Contract FAA/BRD-420)
Unclassified report

DESCRIPTORS: *Flight paths, *Air transportation, Air traffic, Global flight, Feasibility studies, Statistical distributions, Statistical analysis, Mathematical analysis, Winds, Design.

Feasibility studies were made of utilizing minimum time tracks in airways design for long range and over-ocean routes. Three routes are considered, using various altitude-air speed combinations: New York - London (18,000 ft - 250 knots, 30,000 ft - 500 knots), San Francisco - London (30,000 ft - 500 knots, 53,000 ft - 1,720 knots), and San Francisco - Honolulu (30,000 ft - 500 knots). A total of 1,275 minimum time tracks taken from five winter seasons, 1955 - 1960, have been analyzed. From this data sample, the geographical range, distributions, and characteristic track configurations are delineated for each of the three routes. Statistical evidence is given to show the range of flight-time savings on each of these routes accruing from the use of minimum time tracks rather than the great circle track. Networks of fixed tracks of varying complexity are derived that approximate actual minimum time track configurations. Flight time penalties incurred by using these various fixed track networks are evaluated. Results indicate that networks of fixed tracks can be derived that preserve the major benefits of minimum time track usage. (Author)

AD-294 398 Div. 1
(TISTA/GEC) OTS price $4.60

Raven Industries, Inc., Sioux Falls, South Dakota.
INTEGRATED INFLATION SHELTER/LAUNCHING DEVICE FOR HIGH ALTITUDE BALLOONS.
Final engineering rept., 24 June 60-8 Oct 62,
by K. J. Walsh. 8 Oct 62, 45p. incl. illus. table, 2 refs.
(Contract DA 36-039-sc-84972)
Unclassified report

DESCRIPTORS: *Balloons, Launching, Launching sites, Reliability, Pneumatic systems, Gusts, Design, Hydrogen, Gas generating systems, Radiosondes.

A study was continued on extending the operational capabilities of the radiosonde system by designing and fabricating equipment to optimize reliability of techniques used to inflate and launch radiosonde balloons in strong, gusty winds. (Author)

AD-294 419 Div. 1
(TISTE/CAM) OTS price $1.60

American Bosch Arma Corp., Garden City, N. Y.
ANALYSIS OF THE RUGGEDIZATION MODIFICATION EFFECTS TO THE D4e ACCELEROMETER,
by J. Collins. 1 Oct 62, 18p. incl. illus. tables (Rept. no. DAG 8428)
(Contract AF 04(694)248)
Unclassified report

DESCRIPTORS: *Accelerometers, Analysis, Vibration, Shock, Resonance, Mathematical analysis, Mechanical properties, Tables.

AD-294 443 Div. 1
(TISTA/GEC) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
OZONE IN JET AIRCRAFT.
Final rept., 19 Dec 61-30 Apr 62,
by R. I. Brabets. 8 May 62, 20p. incl. illus. tables (Rept. no. ARF 3211-1)
(Contract FA-2688)
Unclassified report

DESCRIPTORS: *Jet planes, Measurement, Flight paths, Aviation safety, Hazards, Aviation personnel, Fatigue (Physiology), Pressurized cabins, Ozone.

A study was conducted to determine whether sufficient ozone is present in the fuselages of high-flying jet aircraft to constitute a potential health hazard for the flight personnel. Over a period of three months, 38 flights were monitored continuously from before takeoff to after landing. The flights ranged from 60 to 325 minutes in duration, and from 9,000 to 39,000 feet in altitude. Combined, they covered the northern and central portions of the continental United States from New York to California, and they included five flights between Hawaii and California. Wide flight-to-flight variations were noted in both the duration and the concentration of the ozone detected. For approximately 50% of the total flight time, no ozone was detected. For the remaining 50% of the time, concentrations varied from 0.01 ppm to as high as 0.22 ppm. The maximum allowable concentration for an eight-hour continuous exposure has been set at 0.1 ppm, and this concentration was exceeded in the aircraft for approximately 6% of the total flight time. Generally, the concentration varied directly with the altitude, but meteorological conditions were also significant. (Author)

AD-294 456 Div. 1
(TISTA/GEC) OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 31, 1-31 Dec 62,
by C. V. Lassmann. 8 Jan 63, 4p. (Engineering rept. no. 4599)
(Contract NOw 60-0060-c)
Unclassified report

DESCRIPTORS: *Jet fighters, Naval aircraft, Refueling in flight, Design, Research program administration, Airplane protuberances.

It was determined that the store is structurally and dynamically compatible with the F4H airplane throughout the specified airspeed envelope. Design changes were established for correction of the recent store malfunction; these changes are presently being incorporated into the second prototype article. (Author)

AD-294 526 Div. 1
(TISTB/DGH) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NATURE (SELECTED ARTICLES).
16 Nov 62, 41p. incl. illus. (Trans. no. FTD-TT-62-1546 from Priroda, no. 9, pp. 5-55, 1962)
Unclassified report

DESCRIPTORS: *Space flight, *USSR.

Contents:
A new phase in studying cosmic space
95 hours in cosmos
Triumphs of reason and labor
We lived and worked in the cosmos
We see new horizons
The secrets of the universe are being revealed
Calmly and confidently
Life beyond the earth
Next flight to the moon and mars

AD-294 561 Div. 1
(TISTA/GEC) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
HOVERING AND WIND-TUNNEL INVESTIGATIONS OF THE DAVID TAYLOR MODEL BASIN 3-FOOT DIAMETER POWERED ANNULAR JET MODEL 430,
by Arthur E. Johnson. Oct 62, 19p. incl. illus. 9 refs. (Rept. no. 1679; Aero rept. no. 1041)
Unclassified report

DESCRIPTORS: *Flying platforms, Model tests, Wind tunnel models, Effectiveness, Design, Jets, Exhaust nozzles, Ground effect.

Hovering characteristics are presented for a 3-foot-diameter annular jet GEM having secondary stabilizing jets. Hovering efficiency approaching that predicted for highly developed GEM's was attained by careful design of internal flow passages. Brief wind-tunnel results, showing the general effects of speed, are also presented. (Author)

AD-294 577 Div. 1
(TISTA/GEC) OTS price $3.00

Lockheed Aircraft Corp., Marietta, Ga.
STUDY AND PRELIMINARY DESIGN OF A HERMETICALLY SEALED HYDRAULIC SYSTEM.
Final rept., 28 May-28 Nov 62.
5 Dec 62, 137p. incl. illus. tables, refs. (Rept. no. ER-6033)
(Contract NOw 62-0143-d)
Unclassified report

DESCRIPTORS: *Hydraulic systems, *Metal seals, Space environmental conditions, Seals, Reliability, Packaging, Military requirements, Specifications, Diaphragms (Mechanics), Couplings, Flexible couplings, Aircraft equipment, Hydraulic fluids, Storage, Encapsulation, Design.

Hermetically sealing an entire hydraulic power system, including a Type III (-65 to 450 F) system, for aerospace applications is found feasible by using presently available techniques. Metallic seals should be used in all component designs and metallic bellows can be used to seal the points where input and output power is transmitted across the system boundary. The selection of seals, design of bellows, and the techniques of joining hermetically sealed hydraulic components and/or packages together to form a totally hermetically sealed hydraulic system are reviewed. Some novel system concepts suitable for hermetic sealing are also included. (Author)

AD-294 610 Div. 1, 5, 6, 19, 33
(TISTW/PCR) OTS price $18.00

Arcon Corp., Lexington, Mass.
SYSTEM ANALYSIS OF THE NORTH ATLANTIC AIR

TRAFFIC COMPLEX.
Final rept.
Dec 62, 281p. incl. illus. tables (Rept. no. R62-3)
(Contract FAA/BRD-334, Proj. 116-9R)
Unclassified report

DESCRIPTORS: *Air traffic, Mathematical analysis, Mathematical prediction, Computers, Programming, Navigation, Communication systems, Weather forecasting, Control systems, Aircraft, Air traffic control systems, Separation, Standards, Configuration, Jet planes, Wind, Statistical analysis, Numerical methods and procedures, Economics, Tracking, Equations, Atlantic Ocean, Mathematical computer data.

This report contains a detailed analysis of the North Atlantic Air Traffic Control System. Emphasis is placed upon the effects on system performance of potential modifications in navigation, communications, weather forecasting, aircraft characteristics, control procedures and separation standards. Mathematical models are developed and applied to operational data. The models provide realistic representations of the significant functional characteristics of the basic system areas. The report includes a description of the present system. The relationships between separation standards and other system areas are developed with emphasis on comparative evaluations of alternate system configurations. System performance is measured in terms of traffic capacity and economic penalties imposed by air traffic control restrictions. The effects of various system modifications are then determined. Although emphasis is placed on subsonic jet aircraft operations over the North Atlantic, a brief discussion of other environments is also given. (Author)

AD-294 614 Div. 1, 29
(TISTB/DGH) OTS price $11.00

Pioneer-Central Div., Bendix Corp., Davenport, Iowa.
INVESTIGATION OF MASK LEAKAGE IN PASSENGER OXYGEN MASKS.
Final rept.
8 Feb 62, 145p. incl. illus. tables (Pub. no. 2266-62)
(Contract FA-885) Unclassified report

DESCRIPTORS: *Oxygen masks, Test methods, Aircraft equipment, Tests.

The determination, development and testing of a simple, reliable and versatile method for testing passenger oxygen masks at sea level conditions and relating these results to the expected performance at higher altitudes was undertaken. A number of concepts and test procedures which might be applicable were investigated to accomplish the goal. Of these various concepts, the test procedure based upon the nitrogen concentration at pulmonary nitrogen washout was considered to be superior to any of the other methods. Using this concept, a group of 200 test subjects were picked at random to test this procedure with two types of passenger oxygen masks. A smaller group consisting of five subjects was used to test this procedure at altitude using the two types of passenger oxygen masks provided under the contract. The procedure was tested at an altitude of 40,000 feet to determine whether or not any discrepancy would exist between data collected at sea level and data collected at altitude. The results obtained at altitude indicated that no apparent difference existed. (Author)

AD-294 626 Div. 1
(TISTA/GEC) OTS price $8.10

Eastern Research Group, New York.
(No title).
Final rept.,
by Leonard Meyerhoff. July 62, 86p. incl. illus. tables (ERG document no. 958)
(Contract NObs-84352, Proj. SF 0130207)
Unclassified report

DESCRIPTORS: *Flying platforms, Ducted fans, Aerial propellers, Design, Thrust, Acceleration, Water waves, Noise, Drag, Aerodynamics, Velocity, Ground effect.

Preliminary performance studies are given of ducted and conventional air propellers on hydroskimmer craft. The study includes the effect of off-design operation on the choice of propellers. Excess thrust for acceleration and operation over a rough sea are examples of off-design. Since the maintenance of low propeller noise is important, results are presented in terms of the resultant blade tip speed as well as propeller rpm. An analysis is made of ducted and conventional air propellers for two hydroskimmers; one is a 20 ton, 70 knot craft, the other is a projected 125 knot craft. For both craft the ducted propeller will have an appreciably smaller diameter than the conventional propeller. The ability to produce excess thrust in off-design is good for both types of propellers. It is shown that the drag increase due to operation over a rough sea can sharply reduce the attainable speed. Propeller parameters governing this condition are shown. (Author)

AD-294 628 Div. 1, 8, 30
(TISTE/OHD) OTS price $13.50

General Precision Lab., Inc., Pleasantville, N. Y.
AUTOMATIC TABULAR BAY GROUP, TYPE IV C.
Final engineering rept.
30 Sep 62, 195p. incl. illus. tables, refs.
(Contract FAA/BRD-310)
Unclassified report

DESCRIPTORS: *Air traffic control systems, *Data processing systems, *Data storage systems, Wiring diagrams, Recording systems, Display systems, Switching circuits, Electronic equipment, Programming, Coding, Digital computers.

Technical effort during the development, design, fabrication and test of the automatic tabular bay group, Type IVC and its associated special test equipment is described. Special emphasis is placed on describing the effort since the final design submission, and on recommending improvements to the designs which could not be incorporated in the deliverable equipment. (Author)

AD-294 664 Div. 1
(TISTA/GEC) OTS price $8.10

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
A POWER PLANT MAN'S LOOK AT THE GROUND EFFECT MACHINE,
by Robert W. Pinnes. Apr 59, 86p. incl. illus. 6 refs. (Rept. no. DR-1958)
Unclassified report

DESCRIPTORS: *Flying platforms, Theory, Design, Ducted fans, Lift, Exhaust nozzles, Jets, Pressure, Model tests, Gas flow, Aerodynamics, Ground effect.

Analyses published to date indicate that the aug-

mentation ratio due to ground effect approaches infinity as the height-to-diameter ratio approaches zero. Consequently, considerable interest has been stimulated in the very low height-to-diameter ratio region, and augmentation ratios of several hundredfold have been suggested in the literature as practical values. It is demonstrated that these very high augmentation ratios will not be obtained. The augmentation ratio due to ground effect increases as the height-to-diameter ratio is reduced only up to a certain point; beyond this point, the augmentation ratio actually decreases if the height-to-diameter ratio continues to be reduced to zero. These conclusions are based on a detailed flow analysis of the annular jet, considering the flow variations across the jet thickness. The importance of the fan characteristics in the overall analysis of the GEM is also indicated. It is demonstrated that the augmentation ratio due to ground effect is only part of the story. The concept of a fan augmentation ratio is developed, and it is shown that the optimum design (maximum lift force per installed horsepower) is actually a compromise between ground effect augmentation ratio and fan augmentation ratio. (Author)

AD-294 812 Div. 1, 9, 31
(TISTE/OHD) OTS price $6.60

Technical Research Group, Syosset, N. Y.
THE LATERAL CONTROL RESPONSE OF THE HYDROSKIMMER CRAFT,
by H. S. Bluston. 23 May 62, 68p. incl. illus. tables, 7 refs. (Rept. no. TRG-158-FR)
(Contract NObs-4433, Proj. SF 0130207)
Unclassified report

DESCRIPTORS: *Speedboats, *Flying platforms, *Flying boats, Hydrofoil boats, Mathematical analysis, Integral transforms, Stability, Nozzles, Control, Marine rudders, Dynamics, Hydrodynamics, Aerodynamics.

Methods are given for obtaining the Hydroskimmer response for the three lateral degrees of freedom and both rudder and variable nozzle control systems. Solutions are obtained in terms of Laplace transforms for any control input and in real time for a step control input. The solutions for the step input depend on functions of the craft stability and control derivatives and these functions are presented graphically in terms of the fundamental craft parameters. The parameters considered are the rudder chord, rudder area, rudder longitudinal distance from the c.g., craft beam, jet thickness and jet exit height. Skeg and water depression effects are briefly discussed. (Author)

AD-294 843 Div. 1
(TISTA/GEC) OTS price $5.60

Engineering Development Lab., Naval Air Development Center, Johnsville, Pa.
COMPARISON OF TWO AUTOMATIC THROTTLE CONTROLLERS FOR THE F8U-2N AIRCRAFT,
by C. R. Abrams. 30 Nov 62, 53p. incl. illus. tables (Rept. no. NADC-ED-L6292)
Unclassified report

DESCRIPTORS: *Jet fighters, Fuel consumption, Automatic pilots, Carrier landings, Flight testing, Airspeed indicators, Test methods, Turbulence, Pitch, Control systems.

A study was made of the F8U-2N aircraft which has adverse approach airspeed characteristics and thrust eccentricity which requires a change in elevator trim with a change in thrust to maintain the same angle of attack. Aircraft with the above-mentioned characteristics require precise throttle control to hold the proper airspeed during the landing phase. Manual throttle control by the pilot may be adequate for manual carrier landings and, for some aircraft, adequate for automatic landings (AN/SPN-10), but generally represents a component of the closed loop system that is unpredictable with respect to dynamic response, gain, and accuracy characteristics. An automatic throttle controller is used to relieve the pilot of the exacting task of throttle manipulation. For automatic landings, dispersion at touchdown can be kept at a minimum by predictable performance characteristics of an automatic throttle. To simplify separation of control authority, for this report, the throttle is used to reduce airspeed errors and the stick is used to maintain flight path. A total of 28 carrier approaches was made to compare the two automatic throttles. During the tests, wind over the deck varied from 33 to 38 kt. Surface wind varied from 4 to 18 kt with gusts to 23 kt. The effect of the throttle systems on airspeed performance was determined. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-293 815 Div. 2
(TISTP/WH) OTS price $3.60

Imperial Coll. of Science and Tech., London (Gt. Brit.).
A CASE-STUDY OF THUNDERSTORMS ON AN OCCASION OF SMALL WIND SHEAR,
by F. H. Ludlam. Sep 62, 29p. incl. illus. table (Technical (Scientific) note no. 11)
(Contract AF 61(052)254, Proj. 8620)
(AFCRL 62-1127) Unclassified report

DESCRIPTORS: *Thunderclouds, *Hail, *Meteorological radar, *Wind, *Air mass analysis, Great Britain, Shear stresses.

An analysis is made of extensive radar and other observations of thunderstorms which occurred over southern England on 18 June 1957. These typical heat storms are shown to be strongly influenced by the large-scale synoptic situation and by topographical effects. Although the instability was large, the individual storms were short-lived, did not contain sustained draughts, and inefficiently converted potential into kinetic energy. The hail produced was only small and sporadic. In all these properties the behavior was in strong contrast to that of the severe Wokingham hailstorm. The difference is attributed to the absence of wind shear on the present occasion, in support of the new model previously advanced for severe local storms. (Author)

AD-293 817 Div. 2, 30
(TISTP/JW) OTS price $1.10

Martin Marietta Corp., Denver Colo.
A BIBLIOGRAPHY OF BIBLIOGRAPHIES ON THE MOON,
by Clyde Briggs. Oct 62, 1p. refs. (Literature search no. 18)
Unclassified report

DESCRIPTORS: *Bibliography, *Moon.

AD-293 862 Div. 2, 20, 25, 15
(TISTW/PCR) OTS price $8.10

Queen's U. Belfast (Gt. Brit.).
RESEARCH ON PHYSICS OF THE UPPER ATMOSPHERE.

Final technical rept.,
by D. R. Bates, A. Dalgarno and others.
30 June 62, 1v. incl. illus. tables, refs.
(Grant no. AF-EOARDC 61-16)
(AFCRL 62-1138)
Unclassified report

DESCRIPTORS: *Upper atmosphere, *Great Britain, Dielectric properties, Dielectrics, Oxygen, Nitrogen, Ions, Recombination reactions, Hydroxides, Helium, Exosphere, Interferometers, Infrared radiation, Quantum mechanics, Scattering, Electron bombardment, Theory, Mobile, Gases, Hydrogen, Atomic structure, Geophysics, Mathematical analysis, Equations, Physics, Scientific research.

Contents:
Dielectronic recombination to normal nitrogen and oxygen ions
Emission from hydroxyl radicles in the nightglow
Sub-visual arcs at middle latitudes
Helium ions in the upper atmosphere
Whistler dispersions for a model of the ionic distribution in the exosphere
Interferometric studies of upper atmospheric emissions
Variations of hydroxyl and oxygen emissions in the infrared airglow
An all-sky interferometer for airglow studies
Fundamental quantal calculations for collision processes and atomic structural problems

AD-293 911 Div. 2, 25
(TISTW/PCR) OTS price $1.10

Washington U., St. Louis, Mo.
INVESTIGATION ON THE PRIMARY COSMIC RADIATION.
Status rept. no. 2 (Final), 16 June 61-25 June 62,
by M. W. Friedlander, J. Klarmann and others.
15 June 62, 3p.
(Contract AF 49(638)833)
Unclassified report

DESCRIPTORS: *Cosmic rays, Nuclei, Fragmentation, Plastics, Magnetic effects, Energy, Test methods, Air force research.

AD-293 977 Div. 2
(TISTB/CCH) OTS price $1.60

Wisconsin U., Madison.
THE XV INTERNATIONAL CONGRESS OF LIMNOLOGY.
Rept. for 20-25 Aug 62.
1962, 15p. incl. tables.
Unclassified report

DESCRIPTORS: *Conferences, *Lakes.

The XV International Congress of Limnology was held August 20-25, 1962 at the University of Wisconsin, Madison. The Congress, the official meeting of the International Association of Theoretical and Applied Limnology, is held every three years and for the first time was held in the United States. Registrants numbered 470 and 31 countries were represented. Three of the sessions were plenary and were devoted to the following topics: Worlds Great Lakes, The Recovery of Nutrients from Organic Effluents, and Decomposition: Processes, Results, and Limnological Significance. A total of 105 overseas scientists were given travel assistance amounting to $40,181.89. The travel grants were made on the basis of scientific accomplishment and need. A special effort was made to aid younger scientists. (Author)

AD-294 020 Div. 2, 8
(TISTP/JW) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
CATEGORY I TEST REPORT WIND MEASURING SET AN/TMQ-15.
Report on Proj. 433L.
Dec 62, 11p.
Unclassified report

DESCRIPTORS: *Wind, Instrumentation, Tests, Antennas, Electrical equipment, Reliability, Measurement.

AD-294 134 Div. 2
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
NACREOUS CLOUDS.
14 Jan 63, 8p. incl. tables, 37 refs.
(AID rept. no. T-63-7, Trans. from Perlamutrovyye Oblaka. Moscow. Universitet Vestnik. Seriya Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii 6:pp. 51-55, 1957).
Unclassified report

DESCRIPTORS: *Clouds, *Meteorological data, Translations, Colors.

Nacreous clouds are one of the most rarely occurring forms of clouds; during the entire history of the physics of the atmosphere they have probably been observed no more than a hundred times. Notwithstanding, nacreous clouds are of extreme interest for the study of the stratosphere. They give an idea of the water-vapor content and condensation phenomena, and also of the velocity and form of motion of the air at altitudes of 21 to 30 km. Nacreous clouds are very thin and transparent; they are observed by day as well as at dusk at an altitude of 21 to 30 km, i.e., much higher than the usual clouds of the troposphere. Bright iridescences of color are visible in nacreous clouds, and it is from these iridescences that the clouds derived their name. As to form, they are similar to lens-shaped clouds (Altocumulus lenticularis), and they show clear traces of a wavelike structure. In shape and color they differ substantially from noctilucent clouds, which are observed at heights of more than 75 km. (Author)

AD-294 158 Div. 2
(TISTP/JW) OTS price $3.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THEORY OF DENSIFICATION OF DRY SNOW ON HIGH POLAR GLACIERS, II,
by Henri Bader. Sep 62, 26p. incl. illus. tables, 5 refs. (Research rept. no. 108)
(Contract DA 11-190-eng-91, Proj. 8X99-29-001-03)
Unclassified report

DESCRIPTORS: *Snow, *Glacier, Mathematical logic, Model tests, Loading, Antarctic regions, Stresses, Viscosity, Density, Arctic regions.

The theory of snow densification is further developed on the basis of an exponential relation between viscosity and density. A linear relation between load-stress and strain rate is not valid for high stresses, and is replaced by a hyperbolic sine function. An empirical function is given for the temperature cycle correction. Two equations are derived for calculating depth-density curves with computers, and a simplified one for use with desk calculators. Instructions are given for determination of function param-

eters from field data. Four depth-density curves for Greenland and Antarctic locations are computed and graphed to show that the theory is useful. (Author)

AD-294 159 Div. 2
(TISTP/JW) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
SIZE DISTRIBUTION AND LIQUID WATER CONTENT OF FOG, NORTHWESTERN GREENLAND,
by Motoi Kumai and Karl E. Francis. Sep 62, 13p. incl. illus. tables, 10 refs. (Research rept. no. 100)
(Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Fog, *Moisture, Distribution, Measurement, Water, Greenland.

AD-294 162 Div. 2
(TISTP/JW) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
PETROGRAPHIC CHARACTERISTICS OF YOUNG SEA ICE, POINT BARROW, ALASKA.
Interim rept.,
by W. F. Weeks and W. L. Hamilton. Oct 62, 11p. incl. illus. table, 17 refs. (Research rept. no. 101)
(Contract DA 11-190-eng-64)
Unclassified report

DESCRIPTORS: *Ice, Crystal structure, Alaska, Linear systems, Growth, Velocity, Scattering, Solids, Oceans.

Studies were made of a 31.4 cm-long core of sea ice obtained from Elson Lagoon, Point Barrow, Alaska, to determine relationships between structural features readily observed in horizontal thin sections under low magnification. Important intercrystalline structural features are a systematic increase in crystal size with depth and a fairly constant 2:1 ratio between the length and width of the ice crystals.

AD-294 182 Div. 2
(TISTP/JW) OTS price $8.60

Free U., Berlin (Germany)
PRELIMINARY DAILY NORTHERN HEMISPHERE 10-MILLIBAR SYNOPTIC WEATHER MAPS OF THE YEAR 1962. PART III. JULY-SEPTEMBER.
Quarterly technical status rept. no. 3,
by Barbara Kriester, Karin Labitzke-Behr, and Richard Scherhag. 1962, 1v. incl. illus.
(Contract DA 91-591-EUC-2148)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Stratosphere, *Meteorological charts, *Barometric pressure, Northern hemisphere, Arctic regions, Diurnal variations.

AD-294 333 Div. 2, 20
(TISTP/TL) OTS price $3.60

United Nuclear Corp., White Plains, N. Y.
A DESCRIPTION OF AN IBM-7090 MONTE CARLO PROGRAM FOR THE SOLUTION OF THE TIME DEPENDENT NEUTRON AND GAMMA TRANSPORT PROBLEMS IN AN ATMOSPHERE WITH DENSITY DEPENDENT ON HEIGHT,
by C. Marotta and W. Guber. Aug 62, 40p. incl. illus. tables (Rept. no. UNC-5031)
(Contract DA 49-186-ORD-1012, Proj. 2172)
Unclassified report

DESCRIPTORS: *Programming, *Atmosphere, *Neutron capture gamma rays, Time, Neutron flux density, Neutron detectors, Neutron counters, Gamma rays, Neutron cross sections, Geometry, Functions, Oxygen compounds, Nitrogen compounds, Sampling, Numerical methods and procedures, Transport properties.

An IBM-7090 Monte Carlo program, UNC-90-6, for the transport of neutrons from a point, monoenergetic source in an atmosphere with density dependent on height, extending up to 700 kilometers above ground zero, is described. The earth is treated as an absorbing surface. The neutron flux is calculated at specified detector regions as a function of time and energy. A simple but effective importance sampling technique is incorporated in the program to improve statistics at detectors many mean free paths from the source. A final edit program is described. This program can be used to superpose, with specified weighting, the results of problems with various monoenergetic sources. Two addenda are included. Addendum 1 describes modifications to UNC-90-6 that permit the use of an anisotropic source and variable initial time for the neutron problem and which transform UNC-90-6 into a gamma ray program (UNC-90-9). Addendum 2 describes a modification to the final edit program. The modification allows for energy-dependent response function calculations. (Author)

AD-294 379 Div. 2
(TISTP/JW) OTS price $8.60

Free U., Berlin (Germany).
PRELIMINARY DAILY NORTHERN HEMISPHERE 30-MILLIBAR SYNOPTIC WEATHER MAPS OF THE YEAR 1962. PART III. JULY-SEPTEMBER.
Quarterly technical status rept. no. 3,
by Barbara Kriester, Karin Labitzke-Behr and Richard Scherhag. 1962, 1v. incl. illus.
(Contract DA 91-591-EUC-2148)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Meteorological charts, Stratosphere, Barometric pressure, Wind, Temperature, Diurnal variations, Periodic variations, Northern hemisphere.

AD-294 385 Div. 2, 31
(TISTP/WH) OTS price $9.60

Pneumodynamics Corp., Bethesda, Md.
PRELIMINARY DEVELOPMENT AND TEST OF A CABLE-TOWED OCEANOGRAPHIC INSTRUMENTATION SYSTEM,
by S. M. Gay, Jr. Dec 62, 1v. incl. illus. 7 refs. (Technical rept. no. 6634-4)
(Contract Nonr-320100)
Unclassified report

DESCRIPTORS: *Towing cables, *Towed bodies, *Oceanography, *Hydrofoils, *Hydrodynamics, Stresses, Design, Instrumentation, Drag, Test methods.

The components of a cable-towed oceanographic instrumentation system have been developed and tested to demonstrated hydromechanical feasi-

bility. As part of the project, a depressor, instrument module, and devices for attaching trailing-type fairing to the tow cable were developed and tested. Designs for these elements are presented. The investigations also included a basic study of specialized winching equipment capable of handling rigid 'lumps' spaced intermittently along the cable. Representative elements of the system, including the winching equipment, were tested at sea. The results of the developmental and sea tests verify the hydromechanic feasibility of towing the system to a depth of 5,000 feet at speeds of seven or eight knots. The capability of the winch in handling and storing cables with intermittent, rigid 'lumps' was also proven. (Author)

AD-294 424 Div. 2
(TISTP/JW) OTS price $1.60

Free U., Berlin (Germany).
WIND AND DENSITY DISTRIBUTION IN THE FREE ATMOSPHERE.
Final technical rept., 1 July 61-30 Sep 62, by P. Beelitz, J. Clauss and others. 30 Sep 62, 12p. illus.
(Contract DA 91-591-EUC-1792)
Unclassified report

DESCRIPTORS: *Wind, *Atmosphere, Weather station, Meteorological data, Climatic factors, Europe, Density.

A detailed description is given of sources of the aerological data of several stations located in Europe, especially in eastern Europe, and the Arctic for the period 1956 - 1960. The techniques used for the elaboration of aerological data for a climatology of the atmosphere over central and eastern Europe are outlined. (Author)

AD-294 506 Div. 2
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STELLAR SCINTILLATION AT PULKOVO,
by A. N. Demidova. 3 Dec 62, 17p. incl. illus. tables, 17 refs. (Trans. no. FTD-TT-62-1430 from Izvestiya Glavnoy Astronomicheskoy Observatorii 21:6, pp. 2-11, 1960)
Unclassified report

DESCRIPTORS: *Scintillation counters, *Astronomical data, Telescopes, Illumination, Translations, Stars, USSR.

The results of observations of stellar scintillations on the AZT-7 telescope are stated. A law of the change in amplitude of scintillation is determined with zenith distance. It is indicated that the law varies, depending on the diameter of the inlet opening. A correlation has been found between the amplitude of scintillation and the quality of the stellar images. Data on the character of amplitude variation of scintillation with various apertures (from 30 to 200 mm) are introduced. The wavelength of density fluctuations in the effective turbulent layer of the atmosphere responsible for stellar scintillation is calculated for three nights of observations according to the Rosch theory. (Author)

AD-294 521 Div. 2
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTERFERENCES DURING PHOTOELECTRIC OBSERVATIONS OF METEORS,
by D. L. Astavin-Razumin. 29 Nov 62, 7p. incl. tables, 3 refs. (Trans. no. FTD-TT-62-1428 from Byulleten' Vsesoyuznoye Astronomo-Geodezicheskoye Obzhchestvo 28(35):pp. 6-10, 1960)
Unclassified report

DESCRIPTORS: *Meteors, *Meteorological instruments, *Interference, Photoelectric materials, Luminescence, Light, Translations.

AD-294 533 Div. 2
(TISTP/JW) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE MAIN ASTRONOMICAL OBSERVATORY IN PULKOVO (SELECTED ARTICLES).
3 Dec 62, 50p. incl. illus. 7 refs. (Trans. no. FTD-TT-62-585 from Izvestiya Glavnoy Astromonicheskoy Observatorii v Pulkove 21:4, pp. 73-87, 96-105, 1960)
Unclassified report

DESCRIPTORS: *Astronomical observatories, Magnetometers, Instrumentation, Solar atmosphere, Translations, USSR.

Contents:
The solar magnetograph of the main astronomical observatory of the Academy of Sciences, USSR
Special aspects of the longitudinal distribution of solar activity

AD-294 547 Div. 2, 20
(TISTP/JW) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
VISUAL HIGH RESOLUTION OBSERVATIONS OF SUNSPOTS,
by Patrick S. McIntosh. Sep 62, 12p. incl. illus. (Rept. no. AFCRL 62-890)
Unclassified report

DESCRIPTORS: *Sunspots, *Visual perception, Telescopes, Feasibility studies, Photographic analysis, Recording systems, Drafting, Measurement, Instrumentation.

This report presents the results of a study to determine the value of visual observations of the fine structure and evolution of sunspots by means of free-hand drawings of sunspot groups obtained with a 3.5-in. catadioptric Questar telescope on several consecutive days. Whereas photographs of the sunspot features are preferable to the drawings, drawings do make a contribution to the qualitative understanding of sunspots, especially when it is not possible to obtain photographs of comparable resolution. (Author)

AD-294 592 Div. 2
(TISTP/JW) OTS price $5.60

Aeronautical Chart and Information Center, St. Louis, Mo.
MAP ACCURACY EVALUATION. PART I. EVALUATION OF HORIZONTAL MAP INFORMATION.
Nov 62, 43p. incl. illus. tables, refs. (ACIC reference pub. no. 2)
Unclassified report

DESCRIPTORS: *Mapping, Reliability, Geodetic data, Measurement, Analysis.

AD-294 613 Div. 2, 22
(TISTW/RD) OTS price $3.60

Friez Instrument Div., Bendix Corp., Baltimore, Md.
DEVELOPMENT OF A ROCKETSONDE INSTRUMENT PACKAGE FOR HIGH ALTITUDE METEOROLOGICAL SOUNDING.
Final rept.,
by J. H. Stoudenmire, R. T. McCoy, and D. R. Greene. Dec 62, 1v. incl. illus. table, 7 refs.
(Contract AF 19(604)8433, Proj. 6670)
(AFCRL 62-875) Unclassified report

DESCRIPTORS: *Atmospheric sounding, *Sounding rockets, *Radiosondes, Parachute descents. Temperature, Measurement, Thermistors, Instrumentation, High altitude, Upper atmosphere.

The development of the Bendix Friez rocket instrument package for use with Rawin Set AN/GMD-2 in high altitude meteorological soundings is described. Primary function of the instrument package (or sonde) is the measurement of atmospheric temperatures as it descends by parachute from apogee, transmitting this data simultaneously with ranging information on a standard radiosonde carrier frequency. Included are design considerations, descriptions of the package's electronic system and structure, discussion of associated thermistor development, results of environmental tests, and recommendations for additional developmental work. (Author)

AD-294 666 Div. 2, 6
(TISTP/TL) OTS price $5.60

New York U. Coll. of Engineering, N. Y.
DEVELOPMENT OF A PRECIPITATION PARTICLE SENSOR.
Final rept., June 60-Apr 61 and Dec 61-June 62,
by Leon Bennett and John Stalder. June 62, 35p. illus. 5 refs. (Rept. no. 783)
(Contract DA 36-039-sc-84964)
Unclassified report

DESCRIPTORS: *Precipitation, *Particles, *Radiosondes, *Drops, Meteorological balloons, Fluid flow, Oils, Heating, Telemetering systems, Calibration, Pressure, Velocity, Temperature, Measurement, Detectors, Design.

A balloon-borne radiosonde sensor capable of measuring the size and concentration of precipitation particles larger than 100 microns in radius was developed in prototype form. The particles are captured in warm oil and forced over resistance measuring contacts. Time of resistance drop is a measure of size. Results are telemetered over conventional equipment. (Author)

AD-294 682 Div. 2, 8
(TISTP/TL) OTS price $2.60

Oregon State U., Corvallis.
INVESTIGATION OF INSTRUMENTATION AND TECHNIQUES FOR ARMY WEATHER OBSERVATION.
Quarterly progress rept. no. 3, 1 Aug-31 Oct 62,
by Fred W. Decker, Kenneth H. Schreeve and others. 31 Oct 62, 18p. incl. illus.
(Contract DA 36-039-sc-89186, Proj. 3A99-27-005-07)
Unclassified report

DESCRIPTORS: *Meteorological radar, *Weather forecasting, Photographic recording systems, Radar echo areas, Microwaves, Calibration, Test sets, Precipitation, Instrumentation.

Instrumental preparation of the AN/CPS-9 during the dry summer season has produced increased automation in the data recording system and a means to monitor and calibrate the system sensitivity to weather targets. This will allow the radar meteorologist to study precipitation phenomena in a quantitative sense. This is a considerable improvement over past capabilities at OSU. The additional electronic and electromechanical devices incorporated during the summer consist of a Step-Gain Control, RHI camera and bezel assembly, two TS-147B/UB microwave test sets, one TS-13 microwave test set, and a collimating radome and feedhorn assembly. Major maintenance problems arising in the AN/CPS-9 radar system have been corrected and measures taken to facilitate trouble free operation during the forthcoming fall storm season. Several weather radar data recording periods provided PPI photographs for detailed analytical comparison with precipitation data and TIROS photographs. (Author)

AD-294 683 Div. 2
(TISTP/TL) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADAR ASTRONOMY,
comp. by Jean E. Britton and Paul E. Green, Jr.
31 Dec 62, 15p. 150 refs. (Reference Bibliography no. 14)
(Contract AF 19(628)500)
(AFESD TDR 62-262) Unclassified report

DESCRIPTORS: *Radio astronomy, *Radar, Theory, Moon, Experimental data, Astronomical data, Astronomy, Bibliography.

Radar astronomy has been defined as the use of radio echo ranging techniques to determine the distance to, and the reflecting properties of, upper atmospheric phenomena and interplanetary objects. This bibliography is concerned with radar investigations of astronomical problems only. Astronomical problems include anything outside the earth's environment, hence the following aspects have been excluded: upper atmospheric phenomena, earth terrain returns from airborne radar, and earth point-to-point communications by means of radar echoes from the moon. The bibliography includes theoretical articles as well as those giving experimental data and descriptions of equipment. It covers the period from 1946 to August 1962. (Author)

AD-294 690 Div. 2
(TISTA/GEC) OTS price $5.60

Pennsylvania U., Philadelphia.
INVESTIGATIONS INTO THE QUANTITATIVE INTERPRETATIONS OF BRIGHTNESS ON TIROS-I FILMS.
Master's thesis,
by James Giraytys. Sep 62, 46p. incl. illus. tables, 8 refs.
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Aerial photographs, Clouds, Cumulus clouds, Identification, Spectrographic analysis, Meteorological data, Reliability, Numerical analysis, Brightness, Meteorology, Photo interpretability.

An attempt has been made to draw quantitative conclusions from Tiros-I cloud pictures. Photometry made possible the construction of isopleths of brightness, and the computation of spectra of brightness variance. The spectra led to objective definitions of structure parameters, on the basis of which clouds can be classified into structured and nonstructured types. So far, the objective classification system does not agree entirely with subjective classification. Furthermore, sampling variations appear trouble-

some. Structured clouds are definitely of the cumulus type. Nonstructured clouds do not permit a clear-cut identification from Tiros-I pictures alone. (Author)

AD-294 723 Div. 2, 8
(TISTP/TL) OTS price $8.60

Queensland U. (Australia).
FIELD ALIGNED IONIZATION IRREGULARITIES. AN INVESTIGATION OF ECHOES OBSERVED FROM BRISBANE,
by E. W. Dearden. Mar 62, 86p. incl. illus. tables, 42 refs. (Scientific rept. no. 13)
(Contract AF 64(500)9)
(AFCRL 62-350) Unclassified report

DESCRIPTORS: *Ionosphere, *Radio waves, *Noise (Radio), *Radio signals, Echo ranging, High frequency, Van Allen radiation belt, Australia, Azimuth, Mapping, Terrestrial magnetism, Propagation, Scattering, Wave transmission, Reflection.

Ionization irregularities in the ionosphere, elongated along the direction of the geomagnetic field, were postulated by several workers, (e.g. Peterson et al, 1955), to account for scattering phenomena observed when the ionosphere is illuminated with radio waves from a transmitter, using a rotating directive aerial. It was suggested that reflections tend to occur when the ray path of the wave intersects the long axis of the irregularities, and hence also the direction of the geomagnetic field, at normal or near-normal, incidence. (Author)

AD-294 748 Div. 2
(TISTP/JW) OTS price $2.60

Geoscience, Inc., Lexington, Mass.
DEEP RESISTIVITY INVESTIGATION IN NEBRASKA,
by T. Cantwell and E. N. Dulaney. Dec 62, 13p. illus. 4 refs. (Scientific rept. no. 2-2351)
(Contract AF 19(628)2351, Proj. 4610)
(AFCRL 62-959) Unclassified report

DESCRIPTORS: *Geological survey, *Geological time, Measurement, Dipole moments, Earth, Surfaces, Minerals, Electromagnetic properties, Nebraska, Analysis.

During November 1962 a series of deep resistivity measurements were made near Auburn, Nebraska for future deep strata communication studies planned in the vicinity of the traverse. The program was planned to allow interpretation down to 1 kilometer. It was thought that the surface layer had a resistivity of 10 ohm-meters and was around 500 feet thick. The second layer was Pre-Cambrian in age and the resistivity of this second layer was to be determined. Field measurements were made using dipole-dipole geometry with dipole lengths from 100 feet up to 2 miles. Dipole separations up to 12 miles were used with a current into the ground of 0.5 amps. The data, fit quite well on a two-layer model curve, with a thickness of the upper layer of 500 feet and a resistivity contrast of 10:1. The upper layer has a resistivity of 15-20 ohm-meters, making the average resistivity of the hidden basement 150-200 ohm-meters. Consideration of the known geology places an upper limit of 800 to 1000 ohm-meters on the hidden layer resistivity that might cause deviations from the assumed model. The Pre-Cambrian basement is not suitable for deep strata communication for the upper Kilometer, and there is no evidence for an increase in resistivity below this point. (Author)

AD-294 794 Div. 2
(TISTP/JW) OTS price $4.60

Weather Forecasting Research Center, U. of Chicago, Ill.
ON THE PLACEMENT OF THE TROPOPAUSE IN THE ANTARCTIC,
by Ronald Overby. Dec 62, 44p. incl. illus. tables, 19 refs. (Scientific rept. no. 9)
(Contract AF 19(604)7230, Proj. 8641)
(AFCRL 62-1134)
Unclassified report

DESCRIPTORS: *Atmosphere, *Weather forecasting, Stratosphere, Temperature, Measurement, Meteorology, Antarctic region, Climatic factors.

Several investigations have led to the conclusion that there is a definite difference between the arctic and the antarctic tropopause. Using the standard definition of tropopause the average height and temperature values for the arctic tropopause for winter are 320 mb and -52 C and for summer they are 260 mb and -56 C. The average values for the antarctic tropopause are reversed, with higher and colder values in winter, 230 mb and -70 C, and lower and warmer values in summer, 300 mb and -50 C. Because of the low stratospheric temperatures in the winter the antarctic tropopause sometimes completely disappears. It was thought that by applying a new definition to determine the placement of the tropopause a reversal of the seasonal fluctuations of the antarctic tropopause might be indicated. This was not proven for the 14 month period used for this study, but the mean height of the tropopause was lowered, the greatest change taking place during the winter season. The number of cases which indicated no tropopause under the conventional definition was reduced when the new definition was applied. (Author)

AD-294 810 Div. 2
(TISTP/JW) OTS price $4.60

Texas A. and M. Coll., College Station.
TIME CHANGES IN A TEMPERATURE LATITUDE CLOUD AND WEATHER SYSTEM AS REVEALED BY METEOROLOGICAL SATELLITE DATA,
by Darryl Randerson. 14 Dec 62, 44p. incl. illus. 19 refs. (Scientific rept. no. 1; Ref. no. 62-22-T)
(Contract AF 19(604)8450, Proj. 6698)
(AFCRL 62-867) Unclassified report

DESCRIPTORS: *Clouds, *Wind, Meteorological instruments, Satellite vehicles, Measurement, Temperature, Climatic factors.

The evolution of developing cloud bands accompanying a slowly moving cold front over the central United States was studied using TIROS I photographs as well as conventional analysis tools. These cloud bands appeared to form in the right entrance region of the axis of maximum wind between the 700-mb and 400-mb levels and move east-southeastward. In the vicinity of and just north of the axis of maximum wind was a zone of very dry, cloudless air. Visual evidence is thus available to further support several jet stream models which suggest high clouds in the vicinity of the right entrance region and cloudless skies in the left entrance region of the high level jet stream. A description and explanation of some low cloud phenomena occurring during the period are also included. Local effects probably caused the pictured clouds to concentrate along the coast line. Over land, the clouds formed into cloud streets which were oriented parallel to the wind near the cloud base. (Author)

AD-294 826 Div. 2
(TISTP/JW) OTS price $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
NEW EXPLORATIONS, NEW RESULTS (NOVYE POISKI, NOVYE REZULTATY) (1961 TUNGUSKA EXPEDITION),
by K. P. Florenskii and I. T. Zotkin, Dec 62, 15p. incl. illus. table (Rept. no. 9990-6346-KU-000; Trans. no. 71 from Priroda (Nature) no. 8, pp. 31-39, Aug 62)
Unclassified report

DESCRIPTORS: *Meteorites, Meteorological data, USSR.

AD-294 833 Div. 2
(TISTM/ODN) OTS price $6.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A ROCKET BORNE INFRARED HYGROMETER FOR THE MEASUREMENT OF WATER VAPOR,
by J. Leeder. Sep 62, 64p. incl. illus. 9 refs.
(BRL memo. rept. no. 1429)
(DA Proj. 599-27-001-01)
Unclassified report

DESCRIPTORS: *Upper atmosphere, *Hygrometers, *Water vapor, Absorption, Telemetering, Telemetering transmitters, Telemetering receivers, Rockets, Illumination, Design, Theory, Electronic circuits, Amplifiers, Calibration, Tests, Voltage, Instrumentation, Infrared equipment, Measurement.

A rocket borne infrared measuring instrument of the spectrometer type is described that, although specifically designed for the measurement of water vapor at high altitudes, could be adapted to the measurement of other absorbing gases in the atmosphere. The sun, near the horizon, is used as a source of infrared radiation for the spectrometer. The signal received at the absorption wavelength of 1.38 microns is compared with that received from a clear window of the atmosphere at 1.25 microns to form a differential signal that is telemetered to earth at various levels of sensitivity. In addition, the strength of the 1.25 micron reference signal is also telemetered as a measure of the illumination intensity. From the foregoing values the absorption of the atmosphere can be calculated as a function of altitude. A grating type spectrometer of the Ebert type is employed for the present instrument. The illumination system consists essentially of a spinning mirror that is adjusted in elevation by a simple search and 'lock on' procedure to illuminate the entrance slit of the spectrometer with pulses of light. (Author)

AD-294 880 Div. 2
(TISTM/ODN) OTS price $1.10

Technical Library, Camp Detrick, Frederick, Md.
BIBLIOGRAPHY ON METHODS OF SAMPLING AIRBORNE PARTICLES (SUPPLEMENT).
26 Nov 56, 5p. refs.
Unclassified report

DESCRIPTORS: *Bibliography, *Air, *Atmosphere, Sampling, Aerosols, Test methods, Particles, Contamination.

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-294 198 Div. 4
(TISTM/SJR) OTS price $1.60

Olin Mathieson Chemical Corp., New Haven, Conn.
A NEW SERIES OF ORGANOBORANES. I. THE CHLORINATION OF 11,12-DICARBADODECABORANE,
by Hansjuergen Schroeder, Theodore L. Heying, and Joseph R. Reiner. 2 Jan 63;034p
6 refs.
(Technical rept. no. 12)
(Contract Nonr-339500, Proj. NR 356-431)
Unclassified report

DESCRIPTORS: *Organoboranes, *Decaboranes, *Molecular structure, Infrared spectroscopy, Ammonium radicals, Phosphonium radicals, Synthesis, Chlorides, Nuclear magnetic resonance.

A detailed investigation of the chlorination of a new series of organoboranes derived from decaborane-14 resulted in the stepwise formation of a number of chlorocarboranes containing from two to eleven chlorine atoms per molecule. Some of their chemical characteristics are described; a detailed B11 NMR treatment of the parent carborane ($B_{10}H_{10}C_2H_2$), $B_{10}C_{11}OC_2H_2$ and $B_{10}C_{11}OC_2HCl$ as related to structural considerations is presented. (Author)

AD-294 308 Div. 4, 7
(TISTE/OHD) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
NEW CATHODE-ANODE COUPLES USING NONAQUEOUS ELECTROLYTE.
Quarterly technical progress rept. no. 1,
by H. F. Bauman, J. E. Chilton and G. M. Cook.
15 Dec 62, 30p. incl. illus. tables.
(Contract AF 33(616)7957)
Unclassified report

DESCRIPTORS: *Storage batteries, Cathodes (Electrolytic cell), Silver compounds, Oxides, Chlorides, Silver, Silver plating, Nickel, Lithium, Electrodes, Electric currents, Effectiveness, Electrodeposition, Electrolytes, Solutions, Satellite vehicles, Reliability.

The use of secondary batteries in conjunction with solar cell charging equipment is a recognized method of supplying and storing electrical power in earth orbiting satellites. New improved secondary batteries, using new cathode-anode couples, with increased energy per unit weight values and long cycle life are necessary to improve the load carrying and useful electrical life of satellites. The objective was to continue a study on the properties of non-aqueous secondary batteries in order to increase the output of such batteries through improvements in battery materials selection, and fabrication techniques. Concurrent with the battery study is a research program to investigate new solvent and soluble materials which will improve the basic electrochemical processes occuring during charge and discharge cycling steps. The

program is divided into four parts: (1) an electrode - cell component investigation consisting of cathode-anode separator and electrolyte studies; (2) cell testing - electrical tests of cells with 2 x 2 inch electrodes at varying percent capacity; (3) battery testing - electrical tests of battery of 4 to 6 cells; and (4) design and test of a 5-AH cell and battery. (Author)

AD-294 334 Div. 4, 25
(TISTM/SJR) OTS price $6.60

Utah U., Salt Lake City.
KINETICS OF THE STEAM-CARBON REACTION (SECTION I). A KINETIC THEORY FOR THE OXIDATION OF GRAPHITE (SECTION II),
by Jesse S. Binford, Jr. and George D. Blyholder.
Aug 55, 64p. incl. illus. tables, 47 refs.
(Technical note no. 12)
(Contract AF 33(038)20839)
Unclassified report

DESCRIPTORS: *Reaction kinetics, *Low pressure research, Graphite, Steam, Chemical reactions, Oxidation, Hydrogen, Carbon compounds, Monoxides, High temperature research.

A description is given of a more satisfactory type apparatus for the study of high temperature (1500 C), low pressure (1 to 100 microns) heterogeneous processes in which one or more products is a gas. The water-gas reaction has been studied in the 900 C to 1300 C temperature range. This is the first kinetic study of this reaction at high temperatures in which the oxidizing gases have been carefully preheated to the reaction temperature. A zero-order reaction with an activation energy of 60.3 kcal/mole is found in the 900 C to 1100 C range, changing to a first order process by 1300 C with a considerably lower value for the activation energy. Several possible mechanisms are discussed, including a surface rearrangement of adsorption sites and pre-dissociation of water vapor. A considerable amount of data on the carbon-oxygen reaction has been collected from the literature, evaluated, and expressed in such a manner that comparison can be made. A theory is proposed which applies to the complete temperature range in which data has been obtained, 350 C to 2000 C. In particular, the unusual maximum in the Arrhenius plot is explained on a theoretical basis although the model proposed is not readily adapted to the known structural features of graphite. (Author)

AD-294 344 Div. 4, 16
(TISTM/SJR) OTS price $1.00

Thiokol Chemical Corp., Trenton, N. J.
PREPARATION OF RADIOPROTECTIVE AGENTS.
Final technical rept., 1 Sep 59-31 Aug 61,
by L. Citarel and N. A. Rosenthal. 31 Aug 62,
28p. incl. illus. tables.
(Contract DA 49-193-md-2053)
Unclassified report

DESCRIPTORS: *Radioprotective drugs, *Polymers, Amines, Thiols, Effectiveness, Toxicity, Thiosulfates, Polarographic analysis, Synthesis.

Bunte salts were synthesized in the hope that the radioprotective action of these compounds would be retained while reducing the toxicity level. It was found that some of the compounds did have fair to good radioprotective action, and in particular N-methylaminoethyl-thiosulfuric acid was found to be superior to the rest of those compounds evaluated. Their toxicity level was usually lower than the corresponding mercaptans. A method of screening compounds using polarographic techniques for the purpose of predicting their effectiveness as radioprotective agents was also developed. It was found that there was some correlation between the radioprotective action of these compounds and their oxidation-reduction potentials. Two approaches have been attempted to incorporate radioprotective groups into a polymeric form. In both cases complications arose due to the extreme labile nature of the reactive groups. A third consideration arose from the desirability of maintaining a soluble polymeric material which would be amenable to infusion into the body. As a result various systems were tried which would enhance the solubility of the polymer in aqueous solution while maintaining the appropriate radioprotective functional groups. Only a few polymers were able to complete these requirements and these at best could not be produced as originally conceived. Of the systems tried, three polymeric materials were submitted for evaluation. (Author)

AD-294 355 Div. 4
(TISTM/ODN) OTS price $1.25

Cincinnati U., Ohio.
RAPID METHODS TO ESTIMATE THE MOLECULAR WEIGHT DISTRIBUTIONS OF POLYMERS.
Final rept., Sep 61-Sep 62 on The Chemistry and Physics of Materials,
by Richard G. Griskey and Siu-Yuen Fok. Dec 62,
42p. incl. illus. table, 33 refs.
(Contract AF 33(616)7450, Proj. 7360)
(ASD TDR 62-879) Unclassified report

DESCRIPTORS: *Polymers, *Nylon, Fractionation, Precipitation, Titration, Tests, Polymer solutions, Spectrophotometers, Molecular weight.

A comparative study of three rapid, inexpensive methods for determination of polymer molecular weight distribution was carried out on 66 nylon samples. The methods were cumulative precipitation fractionation, swelling and turbidimetric titration. The most rapid and precise of these was found to be turbidimetric titration. (Author)

AD-294 400 Div. 4
(TISTM/SJR) OTS price $3.60

Rocketdyne, Canoga Park, Calif.
RESEARCH IN FLUORINE CHEMISTRY.
Progress rept., 16 Sep-15 Dec 62,
by H. H. Rogers, J. H. Johnson, and S. Evans.
8 Jan 63, 28p. incl. illus. tables, 10 refs.
(Rept. no. R-334-20)
(Contract Nonr-181800)
Unclassified report

DESCRIPTORS: *Electrochemistry, *Fluorides, *Nitrogen compounds, *Electrolytic cells, Electrodes, Anodes (Electrolytic cell), Corrosion, Ammonia, Oxyfluorides, Sodium compounds, Nitrides, Oxychlorides, Cathodes (Electrolytic cell), Nickel, Synthesis, Hydrogen compounds, Oxides, Polarization.

Data from the electrolysis of the HF-N_2O_4, HF-NO, HF-N_2O_4-NO, HF-N_2O and the HF-FNO systems are correlated. It is concluded that the presence of H_2O in most systems, either as an initial component or as an electrolysis product, causes the same electrolysis products to form. New data on electrolyses in the HF-N_2O, HF-FNO, and HF-NH_3 systems are presented. It is suggested that the probable solubility of resulting F-N-O compounds in HF is accompanied by further electrolytic oxidation, thereby preventing their synthesis by electrolysis in HF. A new procedure for the electrolytic drying of HF, based on

current reversal, has been developed and is described. The process of nickel dissolution at the anode during electrolysis is discussed, and a hypothesis explaining observed phenomena is presented. (Author)

AD-294 406 Div. 4
(TISTM/RGR) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF MINUTE QUANTITIES OF SELECTED ELEMENTS IN BERYLLIUM.
Interim rept. no. 3, 6 Oct-6 Dec 62,
by W. M. Henry. 11 Jan 63, 6p. incl. table.
(Contract NOw 62-0629-c)
Unclassified report

DESCRIPTORS: *Chemical analysis, *Beryllium, Spectrographic analysis, Carbon, Chemical impurities, Oxygen, Radiochemistry, Electrochemistry, Microanalysis, Quantitative analysis, Resistance.

Experimental work on beryllium directed primarily toward method development and evaluation in the following analytical areas is described: emission and mass spectrography, carbon analysis, activation analysis for oxygen determination and resistivity measurements. (Author)

AD-294 451 Div. 4, 10
(TISTM/EJH) OTS price $7.60

Atlantic Research Corp., Alexandria, Va.
HAZARDS OF LIQUID HYDROGEN IN RESEARCH AND DEVELOPMENT FACILITIES.
Final rept., 1 May-1 Nov 62,
by Guenther von Elbe and Howard T. Scott, Jr.
Dec 62, 75p. incl. illus. tables, 27 refs.
(Contract AF 33(657)8952, Proj. 8119)
(ASD TDR 62-1027) Unclassified report

DESCRIPTORS: *Hydrogen, *Liquid rocket propellants, *Hazards, Physical properties, Chemical properties, Combustion, Detonation, Chemical reactions, Oxygen, Fluorine, Chlorine, Storage, Containers, Pressure, Safety, Cryogenics, Liquefied gases.

Hazards associated with the use of liquid hydrogen in research and development facilities are discussed, and applicable techniques of hazard prevention and control are reviewed. The physical and chemical properties of hydrogen are summarized with emphasis on the relation of these properties to combustion and detonation processes. Information was collected on experiences and practices in numerous facilities. Hazards comprise the possibility of pressure rupture of containers, initiation of flammable mixtures formed by release of hydrogen due to vessel failure or other causes, and explosion of hydrogen and contaminating oxygen under cryogenic conditions. The theory of chemical reaction provides a complete understanding of the combustion and detonation characteristics of hydrogen-oxygen systems and defines the chemical and physical requirements for inhibition and control of combustion and detonations. General safety procedures are suggested, and subjects warranting further investigation indicated. (Author)

AD-294 507 Div. 4, 25
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BORIDES OF TRANSITION METALS AND THEIR ELECTRON-EMISSION PROPERTIES,
by G. A. Kudintseva, B. M. Tsarev and V. A. Epel'baum. 3 Dec 62, 11p. incl. tables, 10 refs.
(Trans. no. FTD-TT-62-1506 from Konferentsii Po Khimii Bora i Yego Soyedineniy, Moscow, Goskhimizdat, pp. 106-111, 1958)
Unclassified report

DESCRIPTORS: *Borides, *Metals, *Electrons, *Thermionic emission, *Secondary emission, Zirconium compounds, Chromium compounds, Titanium compounds, Vanadium compounds, Manganese compounds, Synthesis, Stability, USSR, Transition elements.

The developed method of obtaining diborides of Ti, Zr, V, Cr, Mn and other transition metals upon the combined reduction by carbon of mixtures of oxides of the corresponding metal and boron permits the production of borides in large quantities from abundant raw material. In a series of diborides of Ti, V, Cr, and Mn of small emissions, comparable with emissions of cerium hexaboride, chromium diboride is possessed, which can be used as material of thermo-cathodes. The diborides possess a coefficient of secondary emission lower than one and, consequently, can be used as antidynatron coatings. (Author)

AD-294 552 Div. 4, 25
(TISTM/RGR) OTS price $2.60

Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N. Y.
THE REACTION RATE OF HYDROGEN AND DEUTERIUM AS MEASURED IN A CHEMICAL QUENCH TUBE,
by Brian C. Swanson. 1962, 29p. incl. illus. table, 6 refs. (AEC rept. no. NP-12163)
(Contract Nonr-40125)
Unclassified report

DESCRIPTORS: *Reaction kinetics, *Deuterium, *Hydrogen, *Exchange reactions, Stable isotopes, Shock tubes, Chemical equilibrium, High temperature research.

A chemical quench tube was built and instrumented in such a way that the reaction rate of hydrogen and deuterium could be measured. The main innovation was the use of a solenoid actuated valve to isolate the reacting gas and prevent it from mixing with the driver gas. The reaction rate was found for temperatures between 1500 and 1850 K. It was shown that the data could be fitted to a line giving a heat of reaction of 60 Kcal/mole which is the generally accepted value. (Author)

AD-294 594 Div. 4, 14
(TISTM/EJH) OTS price $2.60

Institute of Rubber Research, U. of Akron, Ohio.
MOLECULAR STRUCTURE AND PHYSICAL BEHAVIOR OF POLYMERS.
Progress rept. no. 9, 1 Aug-31 Oct 62,
by Maurice Morton and A. N. Gent. 5 Dec 62,
22p. incl. illus. tables, 5 refs.
(Contract AF 33(616)6965)
Unclassified report

DESCRIPTORS: *Polymers, *Ethylenes, *Rubber, *Copolymerization, *Polymerization, Isoprene, Styrenes, Toluene, Cumenes, Crystals, Crystallization, Melting, Organic solvents, Stresses, Temperature, Molecular structure, Tensile properties, Mechanical properties.

Stress-temperature relations were investigated for linear polyethylene, crosslinked to varying extents by gamma irradiation, and subjected to elongations of varying amount. The incipient crystallization temperature T sub c was found

to be reduced only slightly over the range of crosslinking employed, in measurements at small extensions. The application of moderate extensions brought about somewhat larger increases in T sub c. The increase was larger for the more highly corsslinked materials, so that a reversal of the T sub c values appeared to occur at extensions of about 250%. Stress changes on crystallization under isothermal conditions was examined. Stress increases were observed, confirming that they are not due solely to thermal contraction. Stress-temperature relations were determined for crosslinked balata. Clear indications of the melting of the beta crystal form were obtained; they suggest that both crystal forms can occur in oriented bundle crystallites. Some studies have been carried out on the chain transfer reaction between polystyryl lithium and toluene or cumene. (Author)

AD-294 625 Div. 4, 10
(TISTM/EJH) OTS price $9.60

Monsanto Research Corp., Dayton, Ohio.
CHEMICAL INHIBITION OF THE HYDROGEN-OXYGEN REACTION.
Rept. for 1 Dec 60-30 Nov 62 on A Research Program for Understanding the Mechanisms of Flame Inhibition,
by G. B. Skinner, D. R. Miller and others.
Dec 62, 104p. incl. illus. tables, 39 refs.
(Contracts AF 33(616)7757 and AF 33(657)7617, Proj. 6075)
(ASD TDR 62-1042) Unclassified report

DESCRIPTORS: *Hydrogen, *Oxygen, *Combustion, *Additives, Pyrolysis, Oxidation inhibitors, Air, Flames, Mixtures, Reaction kinetics, Hydrocarbons, Halocarbons, Bromides, Fluorides, Tin compounds, Antimony compounds, Methanes, Ethylenes, Argon, Velocity, Test methods, Shock tubes, Spectrographic analysis, Iron compounds, Carbonyl radicals, Inhibition.

The effects of inhibitors on the hydrogen-air reaction were studied by measuring flame speeds of hydrogen-air-inhibitor mixtures, and via shock tube and spectroscopic techniques. The best inhibitors were hydrocarbons as a group, bromine-substituted hydrocarbons, several metallic chlorides, and iron carbonyl. Detailed kinetic studies of the effects of CH_4, C_2H_4, C_2F_3Br and $C_2F_4Br_2$ on the hydrogen-oxygen reaction indicate that they remove radicals - chiefly H atoms - from the reacting gas when it is in the temperature range 900 - 1300K. Methods for calculating reaction kinetics from the experimental data are described briefly. (Author)

AD-294 632 Div. 4
(TISTM/EJH) OTS price $4.60

Inorganic Research Lab., Western Reserve U. Cleveland, Ohio.
REACTIONS OF OXODIHYDROXYDICHLOROMOLYBDENUM,
by Gary R. Kern and Mark M. Chamberlain.
28 Dec 62, 1v. incl. illus. tables, refs.
(Technical rept. no. 4)
(Contract Nonr-143907, Proj. NR 052-419)
Unclassified report

DESCRIPTORS: *Molybdenum compounds, *Metal-organic compounds, Silicon compounds, Oxygen compounds, Molybdates, Formamides, Pyridines, Pyrroles, Ketones, Amines, Silicones, Hydroxides, Chlorides, Ethanols, Chemical reactions, Synthesis, Infrared spectroscopy, Lattices, Crystal structure.

The purposes of this investigation were (1) to prepare compounds containing the molybdenum-oxygen-silicon linkage and (2) to study the reactions of oxodihydroxydichloromolybdenum with a variety of organic bases. All attempts to form stable, well defined compounds containing the Mo-O-Si linkage were unsuccessful. In the search for proper conditions to effect the formation of this linkage by reaction of oxodihydroxydichloromolybdenum, $MoO(OH)_2Cl_2$, and triphenylsilanol, it was found that the molybdenum species formed a variety of compounds with organic bases. With the weak bases N,N-dimethylformamide and N-methyl-2-pyrrolidone the adducts $MoO(OH)_2Cl_2.2B$ are formed. The stronger base ethanolamine forms the compound $MoO_2(NH_2CH_2CH_2O)_2$ and pyridine the compound $(PyH)_2Mo_4O_{13}$. Recrystallization of the dipyridiniumtetramolybdate from water forms $(PyH)_2H_2Mo_4O_{14}$, dipyridiniumdihydrogentetramolybdate. Lattice parameters and molecular weight were obtained for dipyridiniumdihydrogentetramolybdate and a structure for this new material proposed., (Author)

AD-294 634 Div. 4
(TISTM/EJH) OTS price $3.60

Frick Chemical Lab., Princeton U., N. J.
THE ROLE OF HYDROGEN BONDS IN THE VISCOELASTIC PROPERTIES OF AMORPHOUS POLYMER NETWORKS,
by M. C. Shen and A. V. Tobolsky. Jan 63, 38p. incl. illus. tables, 29 refs. (ONR Technical rept. no. RLT-55)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Polymers, *Viscosity, *Elasticity, *Chemical bonds, *Acrylic resins, Hydrogen, Temperature, Time, Transition temperature, Mechanical properties, Relaxation time, Copolymerization, Hydroxides, Ethyl radicals, Amines, Propyl radicals, Alkoxy radicals.

Modulus-temperature studies: The influence of hydrogen bonds on the viscoelastic properties was studied by constructing the modulus-temperature curves of a series of homo- and copolymers of methacrylates. It is seen that only the inflection temperatures change as a function of the degree of hydrogen bonding. The glassy moduli, the rubbery moduli and the slopes at the transition region remain essentially constant. Physical interpretations on the molecular scale are given to explain the experimental observations. Modulus-time studies: The influence of hydrogen bonds on the viscoelastic properties of polymers is studied by comparing the master curves of poly-2-hydroxyethyl methacrylate and poly-n-propyl methacrylate. Only the inflection temperature is higher for poly-2-hydroxyethyl methacrylate. The data are found to fit the WLF equation very satisfactorily. (Author)

AD-294 725 Div. 4, 25
(TISTM/RGR) OTS price $10.50

Stanford Research Inst., Menlo Park, Calif.
A BIBLIOGRAPHY OF BINARY I-VII COMPOUNDS, VOLUME I,
by W. J. Fredericks, E. J. Keneshea, Jr. and F. Craig. 1962, 138p. (Scientific rept. no. 2, vol. 1)
(Contract AF 19(604)7231)
(AFCRL 62-917, vol. 1)
Unclassified report

DESCRIPTORS: *Bibliography, *Solid state

physics, Literature, Crystals, Synthesis, Electrical properties, Optics, Thermodynamics, Mechanical properties, Crystal structure, Dielectric properties, Fluorides, Chlorides, Bromides, Iodides, Lithium compounds, Sodium compounds, Potassium compounds, Rubidium compounds, Cesium compounds, Copper compounds, Silver compounds.

AD-294 726 Div. 4, 32
(TISTM/ODN) OTS price $10.10

Stanford Research Inst., Menlo Park, Calif.
A BIBLIOGRAPHY OF GROUP II-VI COMPOUNDS. VOLUME II,
by W. J. Fredericks, F. J. Keneshea, Jr., and F. Craig. 1962, 114p. (Scientific rept. no. 2, vol. 2)
(Contract AF 19(604)7231)
(AFCRL 62-917, vol. 2)
Unclassified report

DESCRIPTORS: *Bibliography, *Inorganic substances, Magnetic susceptibility, Preparation, Growth, Crystals, Electrical properties, Absorption, Reflection, Optics, Luminescence, Dielectric properties, Diffusion, Molecular structure, Thermodynamics, Lattices, Surfaces, Mechanical properties, Nuclear resonance.

A convenient 1946-1961 bibliography of research on II-VI compounds is provided. The entries are listed under compound and subject. To assist the user in locating articles by subject, as well as by author and compound, a series of columns on the right-hand edge of each page is marked to indicate the various subjects treated in each article. (Author)

AD-294 727 Div. 4, 25
(TISTM/RGR) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
A BIBLIOGRAPHY OF GROUP III - V COMPOUNDS, VOLUME III,
by W. J. Fredericks, F. J. Keneshea, Jr. and F. Craig. 1962, 59p. (Scientific rept. no. 2, vol. 3)
(Contract AF 19(604)7231)
(AFCRL 62-917, vol. 3)
Unclassified report

DESCRIPTORS: *Bibliography, *Semiconductors, Literature, Boron compounds, Aluminum compounds, Gallium compounds, Indium compounds, Arsenides, Antimonides, Nitrides, Phosphides, Crystals, Synthesis, Electrical properties, Optics, Thermodynamics, Mechanical properties, Crystal structure, Dielectric properties.

AD-294 728 Div. 4, 32
(TISTM/ODN) OTS price $13.50

Stanford Research Inst., Menlo Park, Calif.
A BIBLIOGRAPHY OF GROUP IV ELEMENTS AND THEIR COMPOUNDS, VOLUME IV,
by W. J. Fredericks, F. J. Keneshea, Jr., and F. Craig. 1962, 189p. (Scientific rept. no. 2, vol. 4)
(Contract AF 19(604)7231)
(AFCRL 62-917, vol. 4) Unclassified report

DESCRIPTORS: *Bibliography, *Inorganic substances, Magnetic susceptibility, Theory, Crystals, Growth, Thermoelectricity, Electrical properties, Optics, Absorption, Reflection, Luminescence, Dielectric properties, Mechanical properties, Surface, Thermodynamics, Photoconductivity.

This report provides a convenient 1946 - 1961 bibliography of research on Group IV elements and their compounds. The entries are listed under element and subject. To assist the user in locating articles by subject, as well as by author and element, a series of columns on the right hand edge of each page is marked to indicate the various subjects treated in each article. (Author)

AD-294 885 Div. 4, 14
(TISTM/ODN) OTS price $3.60

Space Sciences Lab. General Electric Co., Philadelphia, Pa.
THE KINETICS OF THERMAL DEGRADATION OF CHARRING PLASTICS. I. CLASS REINFORCED PHENOL-FORMALDEHYDE,
by Henry L. Friedman. Aug 61, 31p. incl. tables, 10 refs. (Rept. no. R61SD145)
(Contract AF 04(647)269)
Unclassified report

DESCRIPTORS: *Reinforcing materials, *Glass textiles, *Phenolic resins, *Plastics, Resins, Deterioration, Reaction kinetics, Formaldehyde, Thermodynamics, Gravimetric analysis, Heat, Theory, Pyrolysis.

A technique was devised for obtaining rate laws and kinetic parameters which describe the thermal degradation of plastics from thermogravimetric analysis data. The method is based on the intercomparison of experiments which were performed at different linear rates of temperature rise. The method was applied to a fiberglass reinforced phenol-formaldehyde resin. The kinetic equation that was thus derived was checked by a variety of techniques, including a comparison with constant temperature data that were available in the literature. The tests indicated that the equation was applicable to a major part of the degradation process. (Author)

5. COMMUNICATIONS

AD-293 826 Div. 5, 28
(TISTE/OHD) OTS price $1.60

Mitre Corp., Bedford, Mass.
VISUAL DISPLAYS-LARGE AND SMALL,
by Sidney L. Smith. Nov 62, 12p. illus.
(Contract AF 33(600)39852)
(ESD TDR 62-338) Unclassified report

DESCRIPTORS: *Display systems, *Human engineering, Data, Effectiveness.

Large and small displays are equivalent in the amount of data they can present under optimal viewing conditions. A large display may be an economical substitute for several smaller individual displays in situations where all members of a group have the same information requirement. In such an application, large displays would compare unfavorably in terms of system reliability. In general, the functional justification of large displays is based on their use, in conjunction with individual display facilities, to present data required for common reference by a group of people. However, various historical factors and non-functional considerations also tend to influence choice of display size. (Author)

AD-293 865 Div. 5, 8
(TISTE/OHD) OTS price $2.60

RAND Corp., Santa Monica, Calif.
CONNECTIVITY OF A BROADCAST STATION NETWORK,

by C. R. Lindholm. Dec 62, 21p. incl. illus. tables, 5 refs. (Research memo. no. 3441-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Radio stations, *Radio teletype systems, *Frequency-shift keyers, Atomic bomb damage, Radio interference, Medium frequency, Propagation, Signal-to-noise ratio, Reliability, Feasibility studies, Vulnerability.

A redundant network consisting of AM broadcast stations is postulated and examined computationally for connectivity under normal and severe propagation and noise conditions. The postulated network was chosen according to conservative ground rules in such a way as to illustrate commercial communication facilities likely to survive an attack on the USZI. Results of the analysis are displayed in a series of maps. This type of network appears feasible for transmission of a few teletype channels even under worst noise conditions. (Author)

AD-294 620 Div. 5, 8
(TISTE/CRJ) OTS price $2.60

Manson Labs., Stamford, Conn.
UHF TRANSMITTING AND RECEIVING SET.
Final development rept.
1 Oct 58, 19p. incl. illus.
(Contract NObsr-72730, Proj. NE-020,000)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Transmitter-receivers, Amplifiers, Radio receivers, Electronic circuits, Modulators, Transmit-receive tubes, Ultra high frequency.

AD-294 648 Div. 5, 16
(TISTB/MS) OTS price $1.60

Louisville U., Ky.
COMMUNICATION BY ELECTRICAL STIMULATION OF THE SKIN.
Annual progress rept., 1 Nov 61-1 Nov 62,
by Emerson Foulke. 1 Dec 62, 17p. incl. illus.
(Grant DA-MD-49-193-62-G49)
Unclassified report

DESCRIPTORS: *Communication systems, *Skin, Coding, Electric currents, Stimulation.

Equipment for the purpose of applying electrical stimuli to the skin has been assembled and tested. With this equipment it is possible to present stimuli that are controlled with respect to frequency, intensity, duration and locus. Stimuli may be presented manually, by means of a keyboard, or automatically, at predetermined sequences and rates, by means of punched tape. A code that makes use of two stimulus durations, two intensities, and ten loci has been constructed. This code contains thirty-nine different stimuli. Twenty-six of them stand for the twenty-six letters of the alphabet. The remaining stimuli are used for punctuation marks, and for frequently occurring letter groups such as 'ing' These contracted forms have been taken directly from the Braille code. Also, the abbreviations that appear in the Braille code, such as 'ag' for again, have been used. Two other codes are to be tested. One will be the same as the one now in use, except that frequency will be substituted for intensity as a code cue. The other code will depend solely upon locus and will require the subject to recognize patterns of electrical stimuli applied simultaneously to the skin. Concurrently with work on the code, exploration of the frequency dimension of the electrical stimulus has been undertaken. Threshold curves and equal apparent intensity contours have been determined. (Author)

AD-294 828 Div. 5, 8, 30
(TISTE/OHD) OTS price $1.10

Technische Hocschule, Darmstadt (Germany).
INVESTIGATION OF THE ERROR STATISTICS OF PULSE DATA UNDER NON GAUSSIAN NOISE CONDITIONS.
Final technical rept., 1 Oct 61-30 Sep 62,
by K. Kupfmuller. 30 Sep 62, 7p.
(Contract DA 91-591-EUC-1964)
Unclassified report

DESCRIPTORS: *Data transmission systems, *Noise (Radio), *Telephone communication systems, Magnetic recording systems, Measurement, Pulse counters, Germany, Digital systems, Errors, Telephone lines, Radio interference.

Investigations in the field of data transmission are presented. Data sent on actual telephone circuits will often be interfered with by irregular line noise. Noise recorded from heavily disturbed subscriber's lines was investigated. A data transmission system using amplitude modulation and a transmission speed of 1800 baud was built up and tests were carried out in the presence of line noise to study the receiver error rates. (Author)

6. DETECTION

AD-293 810 Div. 6, 8
(TISTW/JEA) OTS price $1.10

General Electric Co., Utica, N. Y.
COUNTERMEASURES TRANSMITTING SET AN/ALT-22(V) AND BARRAGE JAMMER QRC-139A-(T). MODIFICATIONS TO AN/ALT-6B COUNTERMEASURES TRANSMITTING SET AND QRC-139A-(T) AGE EQUIPMENT.
Monthly progress rept. no. 3, 1-31 Dec 62.
11 Jan 63, 5p.
(Contracts AF 33(604)38334 and AF 09(603)41935)
Unclassified report

DESCRIPTORS: *Radar transmitters, *Radar jamming, *Radar equipment, *Radiofrequency spectrum analyzers, L band, Broadband, Noise analyzers, Noise generators, Frequency convertors, Countermeasures, Manufacturing methods.

Research is presented on work accomplished from 1 December 1962 to 31 December 1962 on the manufacture of 30 L-band QRC-139A-(T) jamming systems; the manufacture of two broadband spectrum analyzers, with converter-measuring, L frequency; one servo noise amplifier modification kit; and one noise response modification kit. (Author)

AD-293 834 Div. 6, 8
(TISTW/JEA) OTS price $9.60

Technical U., Copenhagen (Denmark).
OBSERVATIONS OF VLF RADIO NOISE AT GODHAVN, GREENLAND.
Final technical rept.,
by Eigil Ungstrup. Sep 62, 108p. incl. illus. tables, 27 refs. (Rept. no. 12)
(Contract AF 61(052)298)
(AFCRL 62-1140) Unclassified report

Presented in partial fulfillment of the requirement of the licentiat degree (Ph.D.) at the Royal Technical University of Denmark.

DESCRIPTORS: *Noise (Radio), *Ionospheric disturbances, *Noise analyzers, *Radio interference, Ionospheric propagation, Recording systems, Signal generators, Radiofrequency power, Terrestrial magnetism, Denmark, Greenland, Antenna horns, Ionosphere, Harmonic analysis, Design, Radio equipment, Sensitivity, Climatic factor, Records, Radio interference analyzers, Arctic regions, Very low frequency, Radio signals, Measurement.

Audio frequency radio noise in the band from 0.5 to 15Kc has been recorded at Godhavn, Greenland since July 19, 1957. The equipment used was designed according to the IGY specifications. In the winter 1958-1959 it proved important to reduce the interference level because strong harmonics of the power frequency coincided with the frequency range of the observed chorus. The reduction in interference level was accomplished by moving the antenna further away from the ionosphere station. At the same time an increased sensitivity was obtained by using a transistorized preamplifier. The increase was of the order of 16 dB. The data taken from the start of the recordings and to the end of 1961 have been treated, and the occurrence of whistlers and the type of ionospheric noise named chorus has been studied. (Author)

AD-293 837 Div. 6, 2
(TISTW/JEA) OTS price $4.60

United Aircraft Corp., East Hartford, Conn.
CATEGORY II TEST OF METEOROLOGICAL RADAR SET AN/FPS-68.
28 Dec 62, 49p. incl. illus. refs. (Rept. no. WSC E-22)
(Contract AF 19(626)16)
(ESD TDR 63-119) Unclassified report

DESCRIPTORS: *Meteorological radar, *Radar equipment, Measurement, C band, Cybernetics, Maintenance, Range, Range finding, Photographs, Hurricanes, Plan-position indicators, Vibration, Azimuth, Control panels, Microwave equipment, Height finding, Position finding, Reliability, Antennas, Design, Construction, Tests, Pulse modulation, Failure (Mechanics), Climatic factors, Ducts, Shock resistance, Weather forecasting, Ultra high frequency.

The results of research performed on the meteorological radar set, AN/FPS-68, that was received for evaluation by the Air Force, are provided. Due to the lack of operational data from the installation at AFCRL-GRD, Maynard, Massachusetts, additional data were obtained from the installation at L. G. Hanscom Field, Massachusetts, and included in the analysis. Included in the analysis are the results of the operational tests, human factors engineering review, and the reliability study on the AN/FPS-68. It is concluded that the AN/FPS-68 demonstrated its feasibility as an operational tool, and that development of the improved model AN/FPS-77(V) is desirable. (Author)

AD-294 148 Div. 6, 22, 30
(TISTW/JEA) OTS price $2.60

Air Force Technical Applications Center, Washington, D. C.
LONG RANGE SEISMIC MEASUREMENTS. MAD.
Report on Vela-Uniform Proj. 8.4.
31 Dec 62, 1v. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Seismic waves, *Seismological stations, *Nuclear explosions, Seismographs, Azimuth, Time interval counters, Explosions, Earthquakes, Sources, Measurement, Mobile, Identification.

A long range seismic measurements (LRSM) program was established under VELA-UNIFORM Project 8.4 to record and analyze short-period and long-period seismic data from a planned series of U.S. underground nuclear tests. These, and other data, will be used by VELA-UNIFORM participants for studying and developing methods for distinguishing between explosive and earthquake sources. The purpose is to provide an analysis of the LRSM film seismograms from 40 mobile field teams, from the Wichita Mountains Seismological Observatory (WMO), Oklahoma, and from several experimental or temporary stations operated in connection with existing AFTAC commitments. (Author)

AD-294 321 Div. 6, 8, 25
(TISTW/JEA) OTS price $11.50

Raytheon Mfg. Co., Burlington, Mass.
INVESTIGATION OF MHD POWER GENERATION. VOLUME II. INTEGRATION WITH CROSSED-FIELD MICROWAVE DEVICES.
Rept. for 15 July 61-1 Apr 62,
by W. D. Brown. 30 June 62, 147p. incl. illus.
(Rept. no. PT-335)
(Contract AF 30(602)2487)
(RADC TDR-62-464, vol. 2) Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Radiofrequency generators, *Microwave amplifiers, *Electromagnetic lenses, Microwave oscillators, Power transformers, Electron beams, Design, Tests, Frequency stabilizers, Waveguide windows, Electromagnetic lenses, Density, Backward wave oscillators, Traveling wave tubes, Waveguides, Phase shifters, Solenoids, Impedance matching, Attenuation, Tuned amplifiers, Cavity resonators, Differential equations, Mathematical analysis, Electric currents, X band, Magnetrons, Cooling, Power supplies, Microwave frequency.

A study of crossed-field microwave devices for the generation of very large amounts of microwave power in conjunction with the use of a magnetohydrodynamic-generator as a source of primary power has been important in establishing better understanding of the power potentialities of the electromagnetic amplifying lens. Although the new EAL concept necessarily has features that a conventional tube does not have, many of the principles of operation, such as the magnetron type of interaction employed, the high dissipation-density cooling, and other features, are firmly based on prior experience with the magnetron and the super power amplitron. (Author)

AD-294 540 Div. 6, 25
(TISTW/PCR) OTS price $1.60

AVCO Marine Electronics Office, New London, Conn.
A SURVEY REPORT - UNDERWATER SOUND REVERBERATION,
by H. W. Marsh. Sep 62, 13p. 95 refs.
(Contract Nonr-335300)
Unclassified report

DESCRIPTORS: *Underwater sound, *Bibliography, Surfaces, Volume, Sonar signals.

A commentary is presented on recent work published on underwater sound reverberation. The commentary is followed by a comprehensive bibliography covering current work available on the subject. (Author)

AD-294 853 Div. 6, 16
(TISTB/DGH) OTS price $3.60

United Research, Inc., Cambridge, Mass.
LOCALIZATION OF SOUND. PART 1. CHARACTERISTICS OF HUMAN LOCALIZATION OF SOUND.
Dec 62, 32p. incl. illus. 10 refs. (Contract N123(60530)23545A)
(NOTS TP 3109, pt. 1)
Unclassified report

DESCRIPTORS: *Sound bearing finders, *Ear, *Acoustic detectors, Hearing, Design, Theory, Experimental data, Auditory perception, Simulation, Sound ranging.

The role of the pinnae, or external ears, is presented from a theoretical viewpoint and experiments reported which support the theories. The pinna is regarded as a mechanical device for performing a transformation on incoming sound. Since the transformation depends on a relative orientation of sound source and pinna, the resultant signal provides localization. Based on theory and experiment, an acoustic coupler to synthesize the pinna role is designed and tested with affirmative results. An additional result of localization is improved signal-to-noise ratio for a chosen location and thus an increase in intelligibility. Voice communications may be improved by using appropriate acoustic coupling providing the role of the pinnae. (Author)

AD-294 864 Div. 6
(TISTM/ODN) OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
PROPERTIES OF PHOTODETECTORS.
Photodetector series rept. no. 53, May-Oct 62, by J. D. Merriam, A. B. Naugle, and W. L. Eisenman. 1 Dec 62, 26p. incl. illus. table.
(NOLC rept. no. 575)
Unclassified report

DESCRIPTORS: *Infrared detectors, *Infrared photoconductors, Blackbody radiation, Detection, Bolometers, Thermistors, Copper compounds, Oxides, Indium compounds, Antimonides, Detectors, Crystals.

This report presents the results of measurements made on ten photodetectors. It includes data sheets on copper oxide and indium antimonide samples and on thermistor bolometers. In tests conducted on the indium antimonide cells, the blackbody response was measured at 500, 860; and on the thermistor bolometers, at 500, 10. A summary of the data obtained is included in tabular form. (Author)

7. ELECTRICAL EQUIPMENT

AD-293 831 Div. 7, 25, 26
(TISTM/ODN) OTS price $2.60

Radio Corp. of America, Somerville, N. J.
GALLIUM ARSENIDE SOLAR CELL PRODUCTION PROCESSES AND TECHNIQUES.
Interim technical documentary progress rept. no. 2, 15 Oct-15 Dec 62,
by H. Bertram, L. H. Gibbons and others.
15 Dec 62, 24p. incl. illus. tables, 4 refs.
(Contract AF 33(657)8921)
Unclassified report

DESCRIPTORS: *Solar cells, *Power supplies, *Gallium compounds, *Arsenides, Single crystals, Crystals, Manufacturing methods, Reflection, Silicon compounds, Monoxides, Growth, Soldering alloys, Simulation, Copper, Gold plating, Nickel, Rupture, Diffusion, Coatings, Voltage, Solar energy.

Efforts to improve the yield of large area, single crystal gallium arsenide as well as supplying crystal for solar cell fabrication continued. Several steps in the solar cell fabrication process, currently in use, were examined carefully in an attempt to improve cell efficiency or increase the potential production rate. Considerable attention was devoted to the means for applying solder contacts to the solar cell. Studies were made of various wafer polishing techniques and their effect on cell efficiency; the deposition of a silicon monoxide antireflection coating on wavers; the evaluation of solar cell p-n junction characteristics using pilot line cells; and solar simulation. (Author)

AD-293 849 Div. 7, 25, 20, 4
(TISTM/ODN) OTS price $1.60

Florida U., Engineering and Industrial Experiment Station, Gainesville.
A STUDY OF THE CONTRIBUTION OF SURFACE FLOW TO MASS TRANSPORT IN POROUS GAS DIFFUSION ELECTRODES.
Summary rept. no. 6 on Fuel Cells,
by Henry R. Wengrow. 15 Dec 62, 14p. incl. tables.
(Contract DA 49-186-502-ORD-860)
Unclassified report

DESCRIPTORS: *Gas diffusion, *Electrodes, *Transport properties, *Gases, *Fuel cells, Adsorption, Pressure, Coatings, Films, Diffusion, Theory, Porous materials, Electrochemistry, Platinum, Graphite, Ethylenes, Polymers, Fluorides, Hydrocarbons.

Surface mobility contributes very little to the total flow through pores except where pore radius is very small ($R < 100$ microns). In this range of pore radii current densities are on the order of 0.1 amp/sq. cm. for a pore of 1 cm length. If pore length is decreased, current density will be increased. Coating of the electrode surface with wet-proofing agents does not appear to affect substantially the flow of gas molecules by surface migration. Therefore, surface migration can be neglected in computing mass transfer in normal porous electrodes for these usually contain pores having radii 1000 microns or larger. (Author)

AD-293 856 Div. 7, 25
(TISTM/EJH) OTS price $3.50

Naval Research Lab., Washington, D. C.
DIRECT ENERGY CONVERSION LITERATURE ABSTRACTS.
Dec 62, 121p.
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Thermionic emission, *Magnetohydrodynamics, *Power supplies, *Fuel cells, *Solar cells, *Bibliography, Photoelectric cells, Primary batteries, Nuclear power plants, Storage batteries, Auxiliary power plants, Biochemistry, Energy, Electrochemistry, Abstracting.

Contents:
Energy conversion (general information, bibliographies, patents)
Thermoelectricity (general information, theory, related phenomena, materials, design, applications)
Thermionic emission (general information, theory, electrode properties, plasma properties, design parameters, devices, systems)
Photoelectric process (photovoltaic, photoemissive, high energy processes)
Magnetohydrodynamics (general information, principles, plasma properties, devices)
Electrochemical processes (fuel cells, primary batteries)
Energy storage (general information, chemical)
Energy sources (chemical fuels, nuclear, solar collection and concentration)
Regulation and control

AD-293 986 Div. 7, 13
(TISTE/OHD) OTS price $3.60

Battelle Memorial Inst., Columbus, Ohio.
MULTIFUELED THERMAL-ENERGY-CONVERSION SYSTEMS.
Quarterly progress rept. no. 1, 1 July-30 Sep 62,
by H. R. Hazard, D. A. Trayser and others.
Sep 62, 32p. incl. illus. tables, 14 refs.
(Rept. no. 1)
(Contract DA 36-039-sc-90838, Proj. 3A99-09-001)
Unclassified report

DESCRIPTORS: *Electric power production, *Gas generating systems, *Thermoelectricity, *External combustion engines, Laboratory furnaces, Wood, Coal, Fuels, Internal combustion engines, Analog computers, Tellurides, Bismuth compounds, Germanium compounds, Selenides, Semiconductors, Lead compounds, Thermocouples.

Operating and control characteristics of several combustion chambers for solid fuels were studied experimentally. It was possible to maintain a uniform exit-gas temperature of 1150 C over a period of several hours in a self-feeding unit fired with green wood or charcoal. This permits heat flux consistent with usual practice in design of thermoelectric generators, at about 4.5 thermal watts/sq. cm., with moderate pressure drop for heat transfer. Design studies of a Stirling-cycle air engine are in progress, and thermoelectric properties of several combinations of semiconductive thermoelectric materials were studied. Research on these studies will continue, followed by studies of vapor-cycle engines and metallic-thermocouple systems. (Author)

Division 7 - ELECTRICAL EQUIPMENT

AD-294 000 Div. 7
(TISTA/GEC) OTS price $6.60

Westinghouse Electric Corp., Baltimore, Md.
PHOTOEMISSIVE ENERGY CONVERSION APPLIED RESEARCH PROGRAM.
Final technical rept., Dec 61-Nov 62,
by Igor Limansky, E. F. Wood and A. S. Jensen.
Dec 62, 1v. incl. illus. table (Rept. no. 1183A)
(Contract AF 33(657)7865, Proj. 8173)
(ASD TDR 62-1021) Unclassified report

DESCRIPTORS: *Power supplies, Solar energy, Feasibility studies, Design, Electric power production, Theory, Photoemission.

The feasibility was studied of making a close-spaced, glass-sandwich photoemissive solar power converter. It was not possible to make operable sealed-off converters in the laboratory due to the difficulty of sealing within a vacuum system and the particular configuration of the device giving a large value of surface-to-volume ratio. The requirement of a low work-function surface for the anode was verified by a test involving changing the interelectrode spacing of a converter in situ within the processing system. Converter action was obtained with a spacing over an inch, but decreased with spacing. It was noted that at closer spacings the output power increases and the internal resistance decreases. Consideration of the subsequent invention and demonstration of the cadmium sulphide solar power converter at relatively high conversion efficiencies and in a thin, flexible, polycrystalline film form leads to the conclusion that the photoemissive converter is no longer competitive. (Author)

AD-294 016 Div. 7, 25
(TISTM/EJH) OTS price $4.60

Harshaw Chemical Co., Cleveland, Ohio.
LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL ARRAY INVESTIGATION.
Quarterly technical progress rept. no. 1,
15 Sep-15 Dec 62,
by F. A. Shirland, J. C. Schaefer and others.
4 Jan 63, 36p. incl. illus. tables, refs.
(Contract AF 33(657)9975, Proj. 8173)
Unclassified report

DESCRIPTORS: *Solar cells, *Auxiliary power plants, *Power supplies, Photoelectric cells, Thin films, Single crystals, Cadmium compounds, Sulfides, Design, Laminates, Sheets, Plastics, Shock resistance, Acceleration, Temperature, Tests, Spaceships.

The major factor now preventing acceptance of the CdS film solar cell as a photovoltaic converter for space auxilliary power systems is that it is untested and unproven in the space environment. Testing of the CdS film cell under the conditions of space and the conditions that would be encountered in getting arrays into space is the principal objective. Secondary objectives are to improve the performance of the CdS film cell and to obtain a better understanding of the fundamentals governing the operation of this cell. Full scale efforts were exerted on the design of CdS film cell arrays, on stability studies and environmental and performance testing, and on the construction of cells and arrays for the orbital evaluation panels. A final design of CdS film cell arrays for the orbital test was evolved, and arrays of this design successfully met the requirements for shock, acceleration, and temperature cycling with no discernible ill effects. A stock pile of large area CdS film cells of greater than 2% conversion efficiency was built up. (Author)

AD-294 194 Div. 7, 26
(TISTM/ODN) OTS price $1.60

Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200 C.
Quarterly rept. no. 6 for period ending 27 Oct 62.
27 Oct 62, 11p.
(Contract DA 36-039-sc-85955)
Unclassified report

DESCRIPTORS: *Capacitors, *Ceramic capacitors, *Barium compounds, *Titanates, *Dielectrics, Melting, Glass, High temperature research, Electrostatic capacitance, Manufacturing methods, Encapsulation, Industrial production, Fluorination, Silicones, Synthetic rubber, Carbonates, Reliability, Silver electrodes.

The fluorinated dielectric has passed 2000 hours of life test at 200 C with no failures. The post life measurements of dissipation factor, capacitance and insulation resistance indicate little, if any, degradational effect of the 2000 hour test. The reliability of these capacitors appears to be outstanding. The molten glass apparently dissolves a portion of the silver electrode during the glass dipping operation. This results in a capacitance loss which can be easily compensated for during silver painting operation prior to glass encapsulation. The final encapsulant of silicone rubber provides an excellent protective envelope but does not contribute toward improved terminal strength properties. (Author)

AD-294 358 Div. 7
(TISTM/ODN) OTS price $3.60

Delco-Remy Div., General Motors Corp., Anderson, Ind.
SILVER ZINC SECONDARY BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 2,
1 Oct 62-1 Jan 63,
by J. J. Lander and J. A. Keralla. 2 Jan 63,
26p. incl. illus. tables.
(Contract AF 33(657)8943, Proj. 8173)
Unclassified report

DESCRIPTORS: *Storage batteries, *Electrolytic cells, *Silver, *Zinc, *Alkaline cells, Electrolytes, Impregnation, Palladium compounds, Salts, Hydrogen, Absorption, Potassium compounds, Hydroxides, Battery separators, Oxides, Ethylene, Polymers, Zinc compounds, Vinyl alcohol, Palladium, Voltage.

Three 25-ampere hour cells constructed with positive plates to which 1% Pd was added by impregnation with a Pd salt have completed 950 cycles of operation on the monovalent voltage level. Hydrogen absorption by Pd-treated Ag positive plates is significantly higher than the standard Ag plate by a ratio of 3 to 1 at 25 C and almost 20 to 1 at 66 C. Silver particle size effects show relatively little difference in effect on capacity, Ag deposition in separators, and cycle life after 500 cycles. Divalent voltage operation results indicate that sealed cell operation could not be accomplished due to excessive O

evolution over 90% of the charge portion of the cycle. Current density and KOH concentration studies on cycle life are continuing at 400 cycles without any trend developing, except that in 5% and 15% KOH, cells fail from 1 to 24 cycles at 25% depth of discharge. Expander studies show that 16% polyethylene oxide and 2% PVA extend the cycle life of cells on the average to 950 cycles at 25% depth of discharge in the sealed condition. Hydrogen evolution studies indicate that a 2% to 4% HgO addition to the negative material, operating in 45% KOH unsaturated (ZnO) produce the least amount of gas in a 30-day period. (Author)

AD-294 417 Div. 7
(TISTM/RGR) OTS price $1.60

New York State Coll. of Ceramics, Alfred U.
HYDROGEN-OXYGEN ELECTRODE STUDY IN HYDROX FUEL CELLS.
Quarterly technical progress rept. no. 4,
by T. J. Gray and W. A. Bridgeo. 15 Dec 62,
8p. illus.
(Contract AF 33(657)7564)
Unclassified report

DESCRIPTORS: *Fuel cells, *Electrodes, Hydrogen electrodes, Oxygen electrodes, Catalysts, Platinum, Graphite, Carbon, Gels, Electrolytes, Porous metals, Nickel, Methyl cellulose, Cellulose, Asbestos fibers.

The presence of platinum chlorides in the electrodes (carbon and Ni) during fuel cell operation will influence electrode potentials and wetting characteristics of the electrode surfaces. Most graphites are more resistant to wetting by concentrated potassium hydroxide than carbons. However, fuel cell electrode materials with smaller median pore diameter and better pore size distribution are available in carbon than in graphite. In addition, the oxygen over potential on carbon is less than that on graphite. The drowning of carbon electrodes by KOH can be overcome somewhat by gelling the latter. An electrolyte gel prepared with 15% KOH and hydroxypropyl methylcellulose was used in a hydrogen-oxygen fuel cell containing platinum-catalyzed carbon electrodes. Shredded purified asbestos was compacted and used as an electrolyte support but results were not satisfactory. A fuel cell was designed and constructed for use with porous metal electrodes and either sheet asbestos electrolyte holder or gelled electrolyte. Preliminary tests were run on the cell using electrodes made from Clevite Corporation's porous nickel No. 3 and 15% potassium hydroxide gelled with hydroxypropyl methylcellulose as electrolyte. (Author)

AD-294 525 Div. 7, 8
(TISTE/OHD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SERVOSYSTEMS WITH SPHERICAL-COORDINATE CONVERTERS BASED ON ROTARY TRANSFORMERS,
by V. P. Yegorov. 5 Dec 62, 17p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-1194 from Sbornik Rabor Po Voprosam Elektormekhaniki, Institut Elektromekhaniki, AN SSSR, Avtomatizatsiya, Telemekhanizatsiya i Priborostroyeniye, Moskva, pp. 162-176, 1961)
Unclassified report

DESCRIPTORS: *Servo systems, *Transformers, *Astronomical observatories, Synchronizers, Electromechanical converters, Analog computers, Translations, USSR, Synchros, Tracking telescopes.

A computer based on rotary transformers is presently being developed at the Institute of Electromechanics, USSR, the function of which, in addition to converting the equatorial coordinates to azimuthal coordinates, is to automatically process the position angle of the celestial body. In addition to automatically coordinating the movements of the telescope tube and the dome slit opening, the coordinate conversion systems based on rotary transformers may be used to solve a whole series of other problems. The most important of these are the automatic aiming and driving of telescopes, optical devices, radiotelescope antennas and locational devices with an azimuthal mounting, and the performance of a number of other assignments involving the conversion of spherical coordinates. (Author)

AD-294 578 Div. 7, 8
(TISTE/OHD) OTS price $1.50

General Electric Co., West Lynn, Mass.
VOLTAGE REGULATION AND CONVERSION IN UNCONVENTIONAL ELECTRICAL GENERATOR SYSTEMS.
Quarterly progress rept. no. 3, 1 July-30 Sep 62, 30 Oct 62, 66p. incl. illus. tables, 1 ref.
(Contract NOw 62-0984-d)
Unclassified report

DESCRIPTORS: *Fuel cells, *Inverted rectifiers, Thermionic emission, Electric power production, Digital computers, Transients, Transistors, Switching circuits, Oscillator circuits, Diodes, Magnetic cores, Voltage regulators, Mathematical analysis.

The progress made in a fuel cell dynamic electrical characteristics study and voltage control by series-parallel switching is reported. Included also are the results to date in developing a light-weight efficient, dc-to-dc 'flyback' circuit. Information giving the results so far in the high frequency switching investigation aimed at reducing circuit weight is also presented with primary emphasis given to magnetic component and transistor switching loss. Introductory information on an ac wave-shaping study pertaining to static inverters is also presented. (Author)

AD-294 624 Div. 7
(TISTE/OHD) OTS price $4.60

Monsanto Research Corp., Dayton, Ohio.
HIGH TEMPERATURE THERMOELECTRIC GENERATOR.
Quarterly progress rept. no. 4, 1 Oct-31 Dec 62,
by C. M. Henderson, R. G. Ault and others.
31 Dec 62, 47p. incl. illus. tables.
(Contract AF 33(657)7387, Proj. 8173)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Generators, *Thermionic emission, Nuclear power plants, Electric power production, High temperature research, Vacuum apparatus, Experimental data, Heating elements, Semiconductors, Graphite, Additives, Coatings, Power metallurgy.

The experimental model generator has completed more than 800 hrs of operation of a sustained performance test at a hot end temperature of 1200 C (+25 -0 C), cold end at about 714 C (+12 -0 C) in a vacuum of 10 to the -5 mm Hg without degradation of its power producing characteristics. Progress was made in efforts to improve the properties of high temperature n-and p-type, proprietary, thermoelectric materials. Investigations were initiated to develop improved emissive cold-end radiator coatings and new methods for fabricating thermoelectric modules. (Author)

AD-294 639 Div. 7
(TISTM/EJH) OTS price $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
DISSEMINATION OF AEROSOLS BY ELECTROSTATICS,
by Roy E. Shaffer. Aug 62, 22p. incl. illus. table, refs. (Rept. no. CRDLR 3141)
Unclassified report

DESCRIPTORS: *Aerosols, *Electrostatics, *Chemical warfare agents, Resistance, Electrical properties, Powders, Electric fields, Liquids, Munitions, Electric discharges, Drops, Scattering.

The objectives of the investigation described were: (1) to study the electrostatic properties of certain presized solids to determine whether they could be used to enhance the dissemination efficiency of powdered solids, and (2) to study the aerosolization of liquids by electrostatic means. Present work has been confined to preliminary studies in an attempt to ascertain the most practical and fruitful approaches to the problem of electrostatic dissemination. The principle of electrostatic precharging as a means to increase dissemination efficiency of finely divided (presized) solids shows promise. Application of the principle to chemical munitions is, however, limited to those compounds having high electrical resistance and by the development of techniques to eliminate or reduce electrical discharge. Although the breakup of liquids into fine aerosols by strong electrical fields is technically feasible and requires low energy input, its application to munitions is doubtful at this time because of design problems. (Author)

AD-294 863 Div. 7, 8
(TISTM/EJH) OTS price $1.10

Melpar, Inc., Falls Church, Va.
THIN-PLATE BATTERY PORTION OF MOLECULAR CIRCUIT DEVELOPMENT..
Monthly letter rept. no. 8, 15 Nov 62-5 Jan 63, by R. T. Foley. 21 Jan 63, 5p. incl. tables.
(Contract NOw 60-0362-e)
Unclassified report

DESCRIPTORS: *Molectronics, *Electrolytic cells, *Power supplies, *Wet cells, Electrolytes, Ammonium radicals, Thiocyanates, Nitrobenzenes, Impurities, Water, Cathodes (Electrolytic cell), Manufacturing methods, Ammonia, Voltage, Materials, Electronic circuits, Design.

During this reporting period, emphasis has been placed on the design and fabrication of six 10-volt, 3-amp, battery-cell pack assemblies and the further improvement of single-cell performance. Special test cells have been run to determine the effect of water, impurities in different grades of meta-dinitrobenzene, and concentration of the NH_4SCN electrolyte salt on the battery system. Some research was also done on alternate methods of cathode matrix preparation. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-293 803 Div. 8
(TISTE/CRJ) OTS price $8.10

Electronic Communications, Inc., Timonium, Md.
PSEUDO RANDOM ARRAY INVESTIGATION,
by J. W. Sherman, M. I. Skolnik and others. 9 Jan 63, 79p. incl. illus. tables, 12 refs.
(Technical note no. 3)
(Contract AF 30(602)2626, Proj. 4506)
(RADC TDR 62-572) Unclassified report

DESCRIPTORS: *Antennas, Antenna radiation patterns, Statistical analysis, Number theory, Lobing, Reduction, Theory, Programming, Measurement.

Investigation was continued on pseudo random arrays. Several areas of study are included with preliminary results obtained in the statistical design method for planar arrays and in dynamic programming as applied to linear arrays. The exploration of number theory to linear arrays was continued, as well as further examination of the ring array technique. Arrays were examined from an energy viewpoint in order to find how the energy is distributed in the radiation pattern. A brief discussion is given of the array modeling technique. (Author)

AD-293 807 Div. 8, 7
(TISTW/JEA) OTS price $2.60

American Machine and Foundry Co., Alexandria, Va.
SOLID STATE MATRIX.
Quarterly rept. no. 3, 1 Oct-31 Dec 62, by R. N. Stock and R. W. Powell. 15 Jan 63, 24p. incl. tables.
(Contract AF 33(657)8688)
Unclassified report

DESCRIPTORS: *Electronic circuits, *Transmission lines, *Miniature electronic equipment, *Switching circuits, *Electronic switches, Aircraft equipment, Reliability, Life expectancy, Direct current, Electromagnetic fields, Power supplies, Airborne, Electric bridges, Semiconductors, Electromagnetic properties, Tests, Solid state physics, Design, Electric power production.

The basic goal of the program is to develop an efficient and practical solid state transmission link (electrical power switching system) that will have positive advantages over the conventional electromechanical transmission links used in present-day aircraft. Primary emphasis is on reliability and long life. Additional design and planning data, and test data are presented. In the event of a conflict between data presented in this report and data presented in any earlier report issued under this program, the data of this report shall prevail. (Author)

AD-293 809 Div. 8
(TISTA/GEC) OTS price $1.10

General Electric Co., Utica, N. Y.
QRC-139A AEROSPACE GROUND EQUIPMENT (AGE).
Monthly progress rept. no. 10, 8 Dec 62-8 Jan 63. 11 Jan 63, 5p.
(Contract AF 33(604)39443)
Unclassified report

DESCRIPTORS: *Radiofrequency spectrum analyzers, S band, L band, Measurement, Ground support equipment, Electronic circuits, Design, Frequency converters.

AD-293 840 Div. 8, 25
(TISTE/OHD) OTS price $2.60

Westinghouse Electric Corp., Baltimore, Md.
DEVELOPMENT OF MILLIMETER WAVE MASER.

Quarterly progress rept. no. 1, 1 June-31 Aug 62,
by W. E. Hughes, C. R. Kremenek, and R. A. Moore.
31 Aug 62, 1v. incl. illus. 7 refs. (Rept. no. A51032AY1A; 1109A)
(Contract DA 36-039-sc-90778, Proj. AAD 51032)
Unclassified report

DESCRIPTORS: *Masers, *Extremely high frequency, Iron, Oxides, Titanium compounds, Broadband, Chemical impurities, Nuclear spins, Lattices, Crystal structure, Digital computers, Dielectric properties, Magnetic fields, Paramagnetic crystals, Ferrites.

Maser material for an amplifier operating near 70 Kmc has been selected to be iron ion Fe^{3+} in a host crystalline structure of TiO_2 (rutile). This selection was made on the basis of the desirable paramagnetic, mechanical, and electrical properties of rutile. The spin Hamiltonian which describes the splitting of the energy levels in an applied magnetic field was solved using a previous computer program, and this allowed the selection of several likely operating points from which to begin the experimentation. A preliminary study of possible broadbanding techniques applicable to this program was initiated during this period. This portion of the program will be concerned with broadband microwave techniques which may be applied to the 70 Kmc maser, and possibly to isolator material studies. (Author)

AD-293 852 Div. 8
(TISTE/OHD) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
SYMMETRIES OF UNIFORM WAVEGUIDE CONTAINING ANISOTROPIC MATERIALS,
by Yoshihio Konishi. 20 Aug 62, 1v. incl. illus. table, 6 refs. (Research rept. no. PIBMRI-1052-62)
(Grant AFOSR-62-295)
Unclassified report

DESCRIPTORS: *Waveguides, Partial differential equations, Mathematical analysis, Ferrites, Tensor analysis, Magnetic fields.

Waveguides, which have symmetry, have simpler electrical characteristics and equivalent circuits, and the symmetry sometimes serves as better matching characteristics than general waveguides when the waveguide includes anisotropic material. The anisotropic conditions under which waveguides can keep the symmetries are discussed. As a practical example, the kind of d.c. magnetic field that may be applied to ferrite materials so that the symmetry of the waveguide is preserved is also discussed. (Author)

AD-293 853 Div. 8
(TISTE/OHD) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
CRITICALLY-DAMPED COMPENSATION FOR BROADBAND AMPLIFIERS,
by Sid Deutsch. 23 July 62, 1v. incl. illus. tables (Research rept. no. PIBMRI-1051-62)
(Contract AF 18(600)1505)
Unclassified report

DESCRIPTORS: *Electrical networks, *Microwave networks, *Amplifiers, Mathematical analysis, Broadband.

Lossless critically-damped 2-terminal and 3-terminal ladders are considered as a means of compensating for parasitic shunt capacitance in broadband amplifiers. Equations are presented that simplify the design of these ladders. The capacitance and inductance values are tabulated for ladders that contain up to 7 reactive elements. The analysis is extended to the limiting case of an infinite number of elements. The element values and transient responses of these optimum ladders are derived. Using a figure of merit that is based on the slope of the step response at its half-amplitude point, the infinite 2-terminal ladder is 59% better than an uncompensated circuit while the 3-terminal ladder is 117% better. (Author)

AD-293 854 Div. 8, 25
(TISTE/CRJ) OTS price $.75

Stanford Research Inst., Menlo Park, Calif.
INTEGRATION OF ENERGY STORAGE AND DISCHARGE MECHANISMS IN BULK SILICON AND GERMANIUM FOR APPLICATION TO NEURISTOR LINES.
Interim rept. no. 6,
by D. R. Chambers. Oct 62, 26p. incl. illus. 5 refs.
(Contracts Nonr-321200 and AF 33(657)7801)
Unclassified report

DESCRIPTORS: *Capacitors, *Thermistors, *Semiconductors, Silicon, Germanium, Temperature, Mathematical analysis, Synthesis, Specific heat, Electric fields, Design, Electronic equipment.

The feasibility of combining the energy storage and energy discharge mechanisms of a parallel thermistor-capacitor combination into a single structure is explored. The pertinent relations required to determine this feasibility are developed and applied to the materials silicon and germanium. It is found that the electric field strengths required to accomplish this integration of functions is critically high. Cooling the materials to below 10 K appears helpful, but the onset of impact ionization at these temperatures voids the gains made in the reduction of the required electric field strength. It is argued that thermistor materials such as silicon and germanium which derive their negative temperature coefficient of resistivity from the thermal excitation of carriers into the conduction band, appear incapable of supporting the desired integration of device functions. This does not rule out, however, structures with added energy storage or structures relying on a different mechanism for the resistance change such as superconductivity. (Author)

AD-293 860 Div. 8
(TISTE/OHD) OTS price $5.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
STUDIES IN THE THEORY OF SWITCHING CIRCUITS.
Final rept.,
by Edward J. Smith. 11 July 62, 46p. incl. illus. tables (Rept. no. PIBMRI-1043-62)
(Contract AF 19(604)6620, Proj. 5632)
(AFCRL 62-915) Unclassified report

DESCRIPTORS: *Switching circuits, Matrix algebra, Special functions, Mathematical analysis, Digital computers, Tables, Diodes, Electrical networks, Electric relays, Theory.

A summary of a program concerned with various problems in the theory of switching circuits is

given. Specific results include: an improved Ambit method for realizing cut-set matrices, the detection of partial symmetry in boolean polynomials, realization of symmetric diode circuits, treatment of combinational relay-diode circuits by matrix and graph theoretic methods, and an improvement in an established technique for minimizing the internal states in an incompletely specified sequential machine. (Author)

AD-293 866 Div. 8
(TISTE/OHD) OTS price $5.60

Tennessee U. Engineering Experiment Station, Knoxville.
PARASITIC EXCITATION OF CONCENTRIC RING CIRCULAR ANTENNA ARRAYS,
by D. R. Stephens and J. D. Tillman. 15 Oct 62, 48p. incl. illus. 10 refs. (Scientific rept. no. 2)
(Contract AF 19(628)288)
(AFCRL 62-912) Unclassified report

DESCRIPTORS: *Coupled antennas, *Antennas, Mathematical analysis, Integral equations, Rings, Dipole antennas, Antenna radiation patterns.

A circular array consisting of a center element and two concentric rings each having six elements is described. The center element, and one element in the outer ring are driven; all of the others are parasites. This antenna is an extension of a parasitic previously developed by Simpson, which had only one ring. The second ring results in lower side lobes, and a slightly narrower main beam. Experimental results are given. (Author)

AD-293 867 Div. 8
(TISTE/OHD) OTS price $3.60

Tennessee U. Engineering Experiment Station, Knoxville.
RADIATION PATTERNS OF COMBINED CIRCULAR LOOP AND CIRCULAR DIPOLE ANTENNA ARRAYS,
by Chi-hau Chen. 15 Oct 62, 34p. incl. illus. 5 refs. (Scientific rept. no. 3)
(Contract AF 19(628)288, Proj. 4600)
(AFCRL 62-913) Unclassified report

DESCRIPTORS: *Coupled antennas, *Dipole antennas, *Loop antennas, Mathematical analysis, Rings, Fourier analysis, Bessel functions, Polarization, Antenna radiation patterns.

An analysis of the radiation patterns of combined circular arrays of loops and dipoles is presented. Such a combination is desirable for two purposes. Loop arrays are usually used to give a phi-polarized field, but an objectionable theta component is present. This can be almost cancelled by adding a properly chosen circular array of dipoles. Further, a different combination can be made to give circular polarization. Curves showing the degree of cancellation of the undesirable theta component are given for several circumferences of loops. Similar curves are also presented showing the way in which the polarization ratio of a combined array varies with polar angle. (Author)

AD-293 868 Div. 8
(TISTE/OHD) OTS price $8.60

Tennessee U. Engineering Experiment Station, Knoxville.
ON SYNTHESIS OF ISOTROPIC PATTERNS WITH CONCENTRIC RING CIRCULAR ARRAY
by Syed Haider Raza Zaidi. 15 Oct 62, 90p. incl. illus. tables, 12 refs. (Scientific rept. no. 4)
(Contract AF 19(628)288, Proj. 4600)
(AFCRL 62-914) Unclassified report

DESCRIPTORS: *Coupled antennas, *Antenna radiation patterns, *Electromagnetic fields, Mathematical analysis, Rings, Dipole antennas, Bessel functions, Impedance.

A procedure is developed to synthesize a specified approximation to an isotropic pattern with a concentric ring circular antenna array. Only synthesis of pattern in the vertical plane is required. This is achieved by expansion of the ideal pattern in a mathematical series. Such a synthesis leads to an antenna with an infinite number of rings. By suitable modifications, however, approximations to the isotropic pattern of practical significance were obtained with as few as three rings. A brief, mostly qualitative, description of circular array theory is included. For use in pattern synthesis, three different types of series expansions were studied. Modifications of the mathematical patterns are investigated in some detail to obtain some useful patterns with 3, 4 and 5 ring arrays. As an illustrative example, a three ring array was designed completely. (Author)

AD-293 888 Div. 8, 30
(TISTP/TL) OTS price $10.10

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
THE TREE AS A STRATAGEM FOR AUTOMATIC INFORMATION HANDLING.
Final technical rept. no. 2,
by Walter I. Landauer. 15 Dec 62, 121p. incl. illus. tables, 22 refs. (Rept. no. 63-15)
(Contracts AF 30(602)2382 and Nonr-55140)
Unclassified report

DESCRIPTORS: *Information theory, *Data processing systems, Data storage systems, Memory devices, Programming, Coding, Electronic systems, Computer logic, Computers.

AD-293 991 Div. 8, 5
(TISTE/CAM) OTS price $1.60

Naval Research Lab., Washington, D. C.
THE HIGH-FREQUENCY SPIRAL ANTENNA AT THE NAVAL RADIO STATION, CHELTENHAM, MARYLAND,
by R. K. Royce. 11 Dec 62, 16p. incl. illus.
(NRL rept. no. 5860)
Unclassified report

DESCRIPTORS: *Antennas, Antenna radiation patterns, High frequency, Attenuation, Propagation, Errors, Measurement, Test equipment, Test methods, Noise (Radio), Signal-to-noise ratio.

An evaluation was made of the spiral antenna for high-frequency point-to-point communication circuits. For a period of six weeks, continuous propagation measurements were made simultaneously on the high-frequency spiral antenna and on a suitable high-frequency rhombic antenna. During the first three weeks operational communication measurements also were made simultaneously on the two test antennas; these measurements were concurrent with the propagation measurements. Based on the results of these measurements, a comparison was made of the performance of the spiral antenna with that of the rhombic antenna both experimentally and operationally. To deter-

mine the reliability of the measurements on a given antenna, the propagation and operational measurements (for that antenna) were compared. (Author)

AD-294 014 Div. 8, 25
(TISTE/OHD) OTS price $12.00

Hewlett-Packard Co., Palo Alto, Calif.
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT.
Interim engineering rept. no. 1, 1 Sep-30 Nov 62, by E. E. Loebner. 30 Nov 62, 1v. incl. illus. tables, 71 refs.
(Contract AF 33(657)9772)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Semiconductors, *Photoconductivity, Luminescence, Gallium compounds, Arsenides, Diodes, Solid state physics, Boron compounds, Phosphides, Transistors, Antimony compounds, Sulfur compounds, Iodides, Thin films, Experimental data, Cryogenics, Zinc.

An optoelectronic approach has been taken for the advanced development of functional electronic blocks. The main experimental effort was directed toward experimentation with GaAs electroluminescent diodes matched to silicon photo-transistors. The highest electroluminous efficiency of zinc into n-type GaAs diffused junction diodes was measured to be somewhat less than 1% at room temperature and 3 to 5% at liquid nitrogen temperature, when integrated over a solid angle of 4 pi outside the GaAs crystal. The highest photon flux observed at room temperature was 10 to the 16th photons/second when pulsed for about 0.1 microseconds. The rise and decay time falls between 30 and less than 5 nanoseconds. The position of the absorption tail on the intrinsic edge was investigated as a function of doping and it was shown that the tail is due to extrinsic transitions in the same recombination center responsible for emission. (Author)

AD-294 030 Div. 8
(TISTE/PAR) OTS price $3.60

Amelco, Inc., Mountain View, Calif.
PHOTRONICS.
Interim engineering rept. no. 2, 16 Aug-15 Nov 62, by M. A. Gilleo. 15 Nov 62, 32p. incl. illus. tables, 17 refs.
(Contract AF 33(657)8678)
Unclassified report

DESCRIPTORS: *Photons, *Light transmission, Transistors, Photoelectric materials, Diodes, Photoelectric effect, Semiconductors, Photoelectric transducers, Photoelectrons, Recombination reactions, Measurement, Light, Electric currents, Negative resistance circuits, Coupling circuits, Transmission.

Research was continued on a photon flux employed to transfer electrical signals from one circuit to another and to combine these signals without any electrical interconnection of circuits. P-n junctions offer a means of performing the basic functions of photon transmission and reception. By the use of double-injection diodes formed on silicon by planar techniques it has been found that most of the forward-current recombination radiation is produced in the highly-doped regions, but that the probability of radiative recombination is higher in the more nearly intrinsic regions. The probability of radiative recombination of electrons in a boron-doped, p+ region was found to be about the same as for holes in a phosphorous-doped, n+ region. Light-coupled transducers, phototransistor-processed dice attached to either end of a glass light-pipe, have been made with current-transfer coefficients as high as 8 x 10 to the -7th power. These transducers operate with either forward or reverse-current input. The reverse-current linearity was the best and extended over a decade range of current. Double-injection diodes have shown a dynamic pinch effect with a high rate of rise of current and, with heavy gold doping, a negative-resistance region. (Author)

AD-294 032 Div. 8, 31
(TISTE/CAM) OTS price $2.60

Airtron, Inc., Morris Plains, N. J.
AN IMPROVED BROADBAND, LOW-LOSS TRANSMISSION LINE SYSTEM TO BE INSTALLED WITHIN A RETRACTABLE SUBMARINE MAST.
Interim development rept., 1 July-31 Oct 62, by Edward S. Hensperger. 21 Nov 62, 26p. incl. illus.
(Contract NObsr-87676, Proj. SS-021001)
Unclassified report

DESCRIPTORS: *Transmission lines, *Submarines, *Coaxial cables, *Waveguides, Broadband, Standing wave ratios, Waveguide windows, Aluminum, Copper, Silver, Dielectrics, Countermeasures, Submarines, Submarine antennas.

Effort is presented on the initial phases to develop an improved transmission line system for use in the ECM mast of a submarine. An improved coaxial-to-double ridged waveguide adaptor was developed which displays a VSWR characteristic not exceeding 1.3. Concern at present is with developing an improved system suitable for production, with emphasis on the following four areas: (1) further reduction of insertion loss by at least 1.0 db as a target figure; (2) reduction in weight without impairing performance; (3) ease of installation in the submarine; and (4) to incorporate a provision which will permit the antenna to be operated in either of two elevated positions approximately four feet apart. (Author)

AD-294 100 Div. 8, 25
(TISTM/EJH) OTS price $3.60

Material Lab., New York Naval Shipyard, Brooklyn.
SCATTERING OF ELECTROMAGNETIC WAVES BY A FERRITE SLAB IN WAVEGUIDE.
Final rept. on Propagation of Electromagnetic Energy in the Presence of Ionized Media (Plasma) Phase I,
by Kalman Kalikstein. 2 Jan 63, 30p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Waveguides, *Ferrites, Wave transmission, Mathematical analysis, Theory, Scattering.

The Kato method for obtaining rigorous upper and lower bounds on the phase shift in a single channel scattering problem is extended to the scattering of electromagnetic waves by a magnetized ferrite slab in a rectangular waveguide. A numerical example is solved with the aid of a simple trial function and a comparison scalar scattering problem. Close bounds are obtained on the phase shifts or the equivalent psi network. (Author)

AD-294 110 Div. 8, 26
(TISTE/CAM) OTS price $5.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE RELIABILITY THRU PROCESS IMPROVEMENT (2N1506).
Quarterly rept. no. 1, 25 June-30 Sep 62,
by S. H. Barnes, F. Chien and others. 30 Sep 62, 52p. incl. tables (PSI rept. no. 3000-43-Q-1)
(Contract DA 36-039-sc-86742)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Processing, Reliability, Failure (Mechanics), Encapsulation, Diffusion, Life expectancy, Quality control, Production, Evaporation, Electrical properties.

Effort is presented on the Production engineering measure to increase transistor reliability. Process improvements within the major tasks of material evaluation, diffusion and photoresist, contact metallizing, lead attachment, and encapsulation were accomplished. Emphasis was placed on the method of contact metallizing and lead attachment. Sample quantities of devices utilizing an evaporated aluminum layer for base and emitter contacts were placed on life test. Equipment was received to begin aluminum wire bonding. Feasibility tests to determine stress levels of the step-stress aging were started. Reliability evaluation of production devices continued to further substantiate the failure rate basis from which the effects of the process improvement tasks will be measured. (Author)

AD-294 154 Div. 8
(TISTE/CAM) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
NEW ASPECTS OF SECOND BREAKDOWN IN TRANSISTORS,
by Bernard Reich. Nov 62, 15p. incl. illus. tables, 3 refs. (ELRDL Technical rept. no. 2319)
Unclassified report

DESCRIPTORS: *Transistors, *Diodes, Electric currents, Electrical properties, Resistance, Theory, Measurement, Electric discharges, Thermal stresses, Tables,

It has been found that the nature of second breakdown is more basic than heretofore recognized. The study has revealed that second breakdown is exhibited in both collector-to-base and emitter-to-base diodes of the transistors as well as voltage regulator diodes. The only restriction on this observation is that the applied diode voltage must be in excess of the sustaining second breakdown voltage. From the nature of the observed thermal resistance characteristics of transistors, it has been assumed that second breakdown is thermal in nature. On this basis an expression has been developed which leads to a first order prediction of the open base breakdown current. (Author)

AD-294 157 Div. 8
(TISTE/PAR) OTS price $3.60

CBS Labs., Stamford, Conn.
RESEARCH AND DEVELOPMENT OF SOLID STATE TUNNEL DEVICES AND ARRAYS CAPABLE OF OPERATION AT MICROWATT POWER LEVELS.
Interim development rept. no. 2, 1 Sep-30 Nov 62, 10 Jan 63, 19p. incl. illus. table, 3 refs.
(Contract NObsr-87512, Proj. SR 0080303)
Unclassified report

DESCRIPTORS: *Diodes, *Semiconductors, Aluminum, Silicon, Evaporation, Electric currents, Voltage, Measurement, Diffusion, Electrostatic capacitance, Alloys, Oxides, Boron, Chemical milling, Packaging, Processing, Chemical impurities, Electron beams, Resistance, Feasibility studies, Space charges.

Research was continued on solid state tunnel devices capable of non-linear and active operation at low power levels. Studies continued on small area backward and tunnel diodes fabricated on semiconductor substrates and capable of operating in the microampere range. In order to fabricate small area tunneling devices, an extensive study of the oxide masking technique of alloying evaporated aluminum to degenerate silicon was performed. However, high excess current in the formed pn junctions could not be reduced satisfactorily. Alloying of aluminum wire, doped with 2.5% boron, to etched surfaces of 0.003 ohm-cm n-type silicon resulted in the formation of devices useful as microampere backward diodes. (Author)

AD-294 180 Div. 8, 26, 25
(TISTE/CRJ) OTS price $2.60

Knights, James, Co., Sandwich, Ill.
GLASS ENCLOSED MINIATURE CRYSTAL UNITS CR-(XM-29/U).
Rept. no. 5, May-July 62,
by R. E. Bennett. July 62, 22p. incl. illus.
(Contract DA 36-039-sc-81298)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystal oscillators, *Manufacturing methods, Very high frequency, Production, Seals, Temperature, Mechanical properties, Electrical properties, Processing.

Research was continued in an effort to develop suitable manufacturing techniques and equipment for sealing 120 crystal units per eight hour day in HC-26/U glass enclosures; to produce pilot runs on five frequencies in the range 50 to 100 mc. Results of experiments with various cements and curing and vacuum baking processes are detailed. The most nearly successful sequence involves pre-curing in air at near room temperature, curing at an elevated temperature near the recommendation of the manufacturer of the cement, and vacuum baking at a still higher temperature to render the cement inert when subjected to the heat of sealing. Three cements are potentially useable, Bondmaster, Isochemduct 3.5, and Bakelite silver. (Author)

AD-294 181 Div. 8, 13, 26
(TISTW/JEA) OTS price $2.60

ITT Kellogg, Chicago, Ill.
VANDENBERG WEAPONS SYSTEM 107A-1 ATLAS.
Program progress rept. no. 68 for Dec 62.
Dec 62, 21p.
(Contracts AF 04(647)123 and AF 04(647)608)
Unclassified report

DESCRIPTORS: *Communication systems, *Control systems, *Cable assemblies, *Radio communication systems, *Telephone communication systems, *Public address systems, *Intercommunication systems, Security classification, Transmission lines, Quality control, Communication equipment, Installation, Guided missiles, Maintenance.

AD-294 302 Div. 8, 26
(TISTE/CRJ) OTS price $3.60

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 2, 14 Aug-14 Nov 62, by W. J. Noroski, Jr. 14 Nov 62, 28p. incl. illus.
(Contract DA 36-039-sc-86731)
Unclassified report

DESCRIPTORS: *Cathode ray tubes, *Manufacturing methods, Vapor plating, Vacuum plating, Electrodes, Aluminum, Photoengraving, Focusing, Production.

Research was continued in an effort to establish and prove the capability for producing production quantities of Deflectron cathode-ray tube types. The adaptation of the vacuum-metallizing technique for manufacturing Deflectron units continues. The model chosen as the test vehicle for the process was redesigned. A suspended-element, or free-electrode, approach was evaluated and proven feasible. (Author)

AD-294 303 Div. 8
(TISTE/OHD) OTS price $13.00

Litton Systems, Inc., College Park, Md.
ANTENNA-RADOME AS-1194(XE-1)/GL.
Final engineering rept.,
by Noel R. White, Jr. 13 July 62, 185p. incl. illus. refs. (Rept. no. 6)
(Contract DA 36-039-sc-84984)
Unclassified report

DESCRIPTORS: *Antennas, *Radomes, Pneumatic devices, Handling, Cargo vehicles, Servo amplifiers, Servo systems, Transmission lines, Radar reflectors, Test methods, Stresses, Mathematical analysis, Antenna radiation patterns, Superhigh frequency, Ultra high frequency, Transistor amplifiers.

Some difficulty was encountered in the design of antenna feed and reflector. The feed problem was in the beamwidth switching area. The problem was resolved by utilizing spiral feed mounted on inflatable rings. The reflector coating suffered decay in a relatively short period of time. The cause was discovered and eliminated. Servo and electrical design proceeded according to plan without major difficulty. An operating engineering test model was delivered. Details of qualification and acceptance testing and stress analysis are given. (Author)

AD-294 314 Div. 8, 26
(TISTE/PAR) OTS price $4.60

Lansdale Div., Philco Corp., Pa.
PEM FOR TRANSISTOR MANUFACTURING PROCESS IMPROVEMENT.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 62, by J. Sanders. 31 Oct 62, 1v. incl. illus. tables, 2 refs.
(Contract DA 36-039-sc-86720)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Reliability, Encapsulation, Seals, High temperature research, Stresses, Storage, Operation, Life expectancy, Chemical milling, Electrodes, Degasification, Production.

The pilot line transistor was converted from an alloyed collector structure to a diffused collector structure. Among the significant improvements which accompany the change is a demonstrated improvement in collector-base diode characteristics. Satisfactory results were achieved in the areas of improved plating edge definition, higher temperature alloys, and lead attachments. Specific changes are reported in the electrodes and alloys of collector and emitter. The changes have eliminated the open electrode failure mode on storage and operational stress. A compound of boron nitride in silicone fluid is being used as an encapsulant. With this encapsulant the pilot line transistor has demonstrated power handling capability 2.5 times higher than that of units sealed in the production encapsulant. The design of the hot sealing oven is complete. Leak testing of all transistors manufactured on the pilot line has continued using helium bombing and the Veeco Mass Spectrometer. Data is given on the environmental, storage, and operating life testing. (Author)

AD-294 315 Div. 8
(TISTE/CRJ) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
TUNNEL CATHODES FOR MICROWAVE TUBES.
Interim rept. no. 2, 1 Sep-30 Nov 62, by D. V. Geppert. Dec 62, 49p. incl. illus. 12 refs.
(Contract AF 33(657)8721, Proj. 4156)
Unclassified report

DESCRIPTORS: *Cold cathode tubes, *Cathodes (Electron tubes), Microwave equipment, Thin films, Gold, Cadmium compounds, Sulfides, Vacuum systems, Electrons, Attenuation, Metal films, Scattering, Theory, Integrals, Processing, Reliability.

Research was continued on the development of the thin-film cold cathode (tunnel cathode) for application to microwave tubes. The experiments using gold-cadmium sulfide-gold cathodes are discussed. The experimental arrangement is described in detail. Such factors as noise, stability, life, emission rise time, emission density, and emission efficiency are discussed. A theory of operation of the Au-CdS-Au cathode is presented that is consistent with the experimental observations. A new calculation of the attenuation length of hot electrons in metals is presented in detail. The new analysis is shown to be more generally applicable than the analysis of Quinn. (Author)

AD-294 317 Div. 8
(TISTE/CRJ) OTS price $2.60

Rhode Island U., Kingston.
THE SURFACE WAVE ANTENNA AS A BOUNDARY VALUE PROBLEM,
by Julius Kane. Sep 62, 20p. 11 refs.
(Scientific rept. no. 3)
(Contract AF 19(604)7983, Proj. 5635)
(AFCRL 62-733) Unclassified report

DESCRIPTORS: *Antennas, Electromagnetic theory, Electromagnetic fields, Mathematical analysis, Green's function, Algebras, Theory.

A theoretical analysis is developed which is applicable to all two dimensional surface wave antennas which can be idealized as reactive surfaces. To illustrate the treatment, a directive array was selected which excites surface waves on a bounded reactive surface as a mathematical version of a surface wave antenna suggestive of say, a Yagi antenna. (Author)

AD-294 329 Div. 8, 20, 25
(TISTE/OHD) OTS price $1.50

Solid State Radiations, Inc., Los Angeles, Calif.
THE APPLICATION OF SEMICONDUCTOR RADIATION DETECTORS TO THE OBSERVATION OF FAST NEUTRONS.
Final rept., Apr 61-Aug 62 on The Chemistry and Physics of Materials,
by E. L. Zimmerman, G. Baladjanian and others.
Dec 62, 52p. incl. illus. 12 refs.
(Contract AF 33(616)8340, Proj. 7360)
(ASD TDR 62-838) Unclassified report

DESCRIPTORS: *Semiconductors, *Neutron detectors, *Nuclear physics, Fast neutrons, Protons, Neutron scattering, Neutron spectrometers, Mathematical analysis, Boron, Evaporation, Thin films, Uranium, Vapor plating, Electrodeposition, Lithium, Silicon, Amplifiers.

Several methods of utilizing a semiconductor radiation detector for neutron observations have been investigated. Techniques for the application of neutron-sensitive materials to detector surfaces have been developed and the resulting coated detectors have been evaluated as both thermal and threshold detectors. A good geometry proton-recoil spectrometer utilizing a semiconductor detector has been built and used to observe fast neutrons. An analytical study of this device resulted in a method which can accurately predict its response as a function of incident neutron energy, hydrogenous radiator thickness, and system geometry. Good qualitative agreement was observed between the predicted and experimental response. Efforts to introduce Li6 into the sensitive region of a detector in order to make the detector neutron energy sensitive by means of the Li6 (n,a) T3 reaction have not been successful to date. However, this effort has contributed substantially to the development of the lithium ion drift detector. (Author)

AD-294 381 Div. 8
(TISTE/OHD) OTS price $5.60

Montana State Coll., Bozeman.
ON CYCLING BEHAVIOR IN 1-DIMENSIONAL, BILATERAL ITERATIVE NETWORKS,
by W. L. Kilmer. Aug 62, 36p. incl. illus. 6 refs. (Scientific rept. no. 3)
(Contract AF 19(604)6619, Proj. 5632)
(AFCRL 62-728) Unclassified report

DESCRIPTORS: *Electrical networks, Mathematical analysis, Coupling circuits, Feedback, Sequences, Sequential analysis, Series, Transients.

The dynamic behavior of bilateral, combinational-cell iterative networks is investigated. All n cells in such networks are identical, and each cell is interconnected to both its right and left neighbor through unit-delay, discrete-variable, information lines. This allows synchronous operation. A network is said to steady-state cycle if its total input-variable and internal-variable signal configuration recurs periodically in time. Such cycling phenomena is studied by reinterpreting network cell structure in such a way as to exhibit the explicit coupling relation between signal sequences that occur at adjacent intercellular network sections. Arrays of regular expression formulae are used to denote these sequences for the case where effective coupling occurs in only one direction. In such cases, the array formulation is developed along existence lines to show that there are corresponding general types of steady state cycling analysis problems that are logically unsolvable. Nevertheless, several interesting subclasses of such problems are easily solvable. The main purpose of the paper is to exhibit the essential character of steady state cycling in large classes of repeated-structure logic networks. (Author)

AD-294 399 Div. 8
(TISTE/CAM) OTS price $5.60

Raytheon Co., Waltham, Mass.
HIGH FREQUENCY TUNNEL DEVICE STUDY,
by J. Lavine and W. Feist. Sep 62, 48p. incl. illus. table, 14 refs. (Technical note no. 2)
(Contract AF 30(602)2673, Proj. 4506)
(RADC TDR 62-481)
Unclassified report

DESCRIPTORS: *Microwave amplifiers, *Transistor amplifiers, *Cathodes, *Diodes, *Solid state physics, Noise, Reduction, Electron beams, Thin films, Growth, Evaporation, Preparation, Electronic circuits, Measurement, Transistors.

Work is reported on achieving low noise microwave amplification - specifically: 20 db gain, 6 db noise figure at 10 kMc, and 1 kMc bandwidth - by using tunneling. Two phases are running concurrently, the first aimed at an all-solid state device, the second at using a thin film cathode in conjunction with a microwave structure. The solid-state amplifier portion involved:(1) an effort to improve the depletion-layer transistor version of the metal-interface amplifier, (2) an effort to obtain hot-electron behavior in the metal-interface amplifier by replacing the Au emitter with CdS, (3) an examination of thermionically emitted hot electrons in the metal-base transistor, and (4) initiation of four-terminal measurements on metal-interface amplifier structures. The main objective of the second phase was to accomplish electron emission into vacuum from a tunnel cathode, to obtain exploratory information about the characteristics of tunnel emission, and to undertake steps towards improving these characteristics to make a tunnel cathode suitable for use in the amplifier. Work was performed in the following areas: (1) the fabrication of tunnel cathode structures using the photomasking process, (2) the preparation of satisfactory thin films, and (3) the evaluation of tunnel cathode performance under pulsed and dc conditions. (Author)

AD-294 421 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Knights, James Co., Sandwich, Ill.
CRYSTAL UNITS TYPE CR(XM-11/U). 1 TO 20 MC IN THE TYPE HC-27/U GLASS HOLDERS.
Progress rept. no. 9, May-July 62,
by R. E. Bennett. July 62, 18p. incl. illus. tables.
(Contract DA 36-039-sc-81274)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystal holders, *Manufacturing methods, Seals, Processing, Adhesives, Sealing compounds, Glass, Frequency shift, Resistance, Tables.

Effort was continued to establish capability to manufacture crystals in the frequency range of 1 to 20 mc, type CR(XM-11)/U, at the rate of 500 per eight-hour shift in the all glass HC-27/U type holders and to produce pilot runs on each of five frequencies, the quantities to be

375 per frequency of natural quartz, and 125 of each frequency to be of cultured quartz. A suitable glass-sealing machine required for this capability is being developed using induction heat. Experiments were conducted with various cements, and pre-curing, curing, and vacuum bake-out cycles. A tabular summary of experiments is presented. (Author)

AD-294 422 Div. 8, 15, 12
(TISTP/JW) OTS price $2.60

Hercules Powder Co., Bacchus, Utah.
CONVERSION OF STRESS RELAXATION MODULUS TO DYNAMIC MODULUS FOR A VISCOELASTIC MATERIAL,
by J. M. Anderson. Nov 62, 15p. incl. illus. tables, 5 refs. (Rept. no. MTO-270-2)
(Contract AF 04(647)243)
Unclassified report

DESCRIPTORS: *Relaxation time, *Integral equations, *Viscosity, Digital computers, Frequency, Stresses, Polymers, Dynamics. Numerical analysis, Elasticity.

AD-294 423 Div. 8, 7
(TISTM/EJH) OTS price $3.60

General Electric Co., Schenectady, N. Y.
EVALUATION OF A MOLYBDENUM EMITTER, LOW VOLTAGE ARC THERMIONIC POWER CONVERTER.
Quarterly technical progress rept. no. 3, 15 Sep-30 Nov 62,
by E. A. Baum. Dec 62, 28p. incl. illus. table. (Rept. no. R-606 Q-3)
(Contract AF 33(657)8323, Proj. 8173)
Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Cesium electron tubes, *Electric power production, *Thermoelectricity, Molybdenum, Life expectancy, Electrodes, Sintered cathodes, Casting, Electric arcs, Sapphires, Manufacturing methods, Deterioration, Seals, Thermionic emission.

Results of extended steady state operation of the Mo emitter Cs vapor converter show that at least 1000 hours of life can be expected with the present converter design at cathode temperatures in the range of 1450 to 1500 C. The power output level with polycrystalline arc-cast molybdenum electrodes was found to remain constant over this operating period, although the life of the converter structure has been shown to be considerably longer. An accumulated total of 4300 hours has been attained on 3 initial design converters operating with ceramic-to-metal seal temperatures between 600 and 650 C. The sapphire material used for maintaining the electrode separation was found to have deteriorated in 2 converters. It is significant that the sapphire spacer material showed evidence of reacting with the anode rather than with the cathode. Converters tested with electrodes fabricated from sintered Mo material showed higher initial power levels than the arc-cast material. Extended steady state operation of 3 converters resulted in an accumulation of 750 hours of operation. The results of the transient tests showed no major instabilities over the normal operating region of the converter. (Author)

AD-294 428 Div. 8
(TISTM/EJH) OTS price $1.60

Laboratories for Applied Sciences, U. of Chicago, Ill.
ANGULAR ENERGY DISTRIBUTION OF PHOTOELECTRONS.
Quarterly progress rept. no. 2, 16 July-16 Oct 62,
by Jay Burns. Nov 62, 14p. incl. illus. (Rept. no. LAS-SR-224-8)
(Contract DA 44-009-eng-5004)
Unclassified report

DESCRIPTORS: *Photoelectrons, *Phototubes, *Cathodes (Electron tubes), Materials, Design, Coatings, Graphite, Cesium alloys, Antimony alloys, Measurement, Electrodes, Focusing, Photomultipliers.

Construction of the experimental tube and its associated equipment, described in some detail in the preceding quarterly report, has proceeded to the point where the completed tube is ready for test and vacuum processing in preparation for making the first (S-9) photocathodes and carrying out initial angular distribution measurements. (Author)

AD-294 438 Div. 8
(TISTE/CRJ) OTS price $1.60

Navy Electronics Lab., San Diego, Calif.
COMPUTING EFFICIENCY OF POWER TRANSMISSION ON A RADIO-FREQUENCY LINE,
by R. T. Brackett. 26 Sep 62, 12p. incl. illus tables, 6 refs. (NEL rept. no. 1138)
Unclassified report

DESCRIPTORS: *Transmission lines, *Coaxial cables, Nomographs, Wave transmission, Radio communication systems, Shipborne, Impedance, Mathematical analysis, Standing wave ratios, Impedance matching, Transformations (Mathematics), Numerical methods and procedures, Radiofrequency power, Effectiveness.

Efforts were made to develop a numerical technique for determining the efficiency of power transmission on a radio frequency line between a source of power and a drain. A nomogram is given for determining the efficiency of power transmission from certain properties of the line and impedance properties at the drain. It is recommended that this nomogram be made available to design agencies for use as one design criterion. (Author)

AD-294 457 Div. 8
(TISTE/CRJ) OTS price $7.60

ARINC Research Corp., Washington, D. C.
PREDICTION OF FIELD RELIABILITY FOR AIRBORNE ELECTRONIC SYSTEMS,
by H. Balaban and A. Drummond. 31 Dec 62, 74p. incl. illus. tables, refs. (Publication no. 203-1-344)
(Contract AF 33(657)7382)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Reliability, Electronic systems, Airborne, Handbooks, Life expectancy, Temperature, Electron tubes, Semiconductors, Capacitors, Resistors, Transformers, Mathematical prediction.

Growing interest in the prediction of the effectiveness of new electronic systems presents the occasion for restating the importance of the position held by the prediction of field or user reliability in the area of product value assurance. This handbook discusses the new prediction procedure in general terms and details a step-by-step procedure for the prediction itself. Detailed discussion of the procedures, formula derivations and presentation of the observed part data in complete form are relegated to a number of appendices. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-294 583 Div. 8
(TISTE/OHD) OTS price $.50

Dearborn Electronic Labs., Inc., Orlando, Fla.
METALLIZED TEFLON CAPACITORS (SUBMINIATURE 200 C).
Summary engineering rept., 1 Jan 59-20 June 62, by Douglas H. Smith, R. J. Simpson and E. D. A. Geoghegan. 20 June 62, 10p.
(Contract AF 33(600)38431, Proj. PB-8-MMP-6209)
(ASD TR 62-7-604A)
Unclassified report

DESCRIPTORS: *Capacitors, Plastics, Ethylenes, Fluorides, Polymers, Subminiature electronic equipment, Temperature, Manufacturing methods, Aluminum, Aluminum alloys, Dielectric films, Thin films, Plastics.

Results of development and processes for the economical fabrication of production quantities of metal encased tubular, hermetically sealed, metallized teflon capacitors reduce the volume per microfarad up to one-fourth that of conventional teflon dielectric foil capacitors. These subminiature metallized teflon capacitors are designed to operate over a temperature range of -65 to 200 C and are capable of withstanding the severe environmental conditions encountered by missiles and space vehicles. (Author)

AD-294 593 Div. 8, 9, 25
(TISTP/JW) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
ELECTROMAGNETIC SOLUTION OF THE INVERTED POTENTIAL WELL PROBLEM,
by Leonard Hatkin. Oct 62, 12p. incl. illus.
(AELRDL Technical rept. no. 2312)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Quantum mechanics, Mechanical properties, Impedance, Measurement, Boundary layer, Equations.

The problem of electronic penetration of a rectangular potential barrier is solved by means of an electromagnetic analogy. Appropriate electromagnetic analogues of the quantum mechanical parameters are pointed out and the fact is indicated that, for most cases, analogous boundary conditions can be set up. An objective of this report is to stimulate interest in the use of electromagnetic engineering techniques for the solution of quantum wave problems which might not readily respond to the application of standard methods. (Author)

AD-294 604 Div. 8, 25
(TISTP/JW) OTS price $1.60

Queensland U. (Australia).
CROSS- AND AUTO-CORRELATION EFFECTS ASSOCIATED WITH ANOMALOUS TRANSEQUATORIAL PROPAGATION AT 16 Mc/s,
by J. A. Thomas. Mar 62, 19p. incl. illus. 3 refs. (Scientific rept. no. 7)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL-62-344) Unclassified report

DESCRIPTORS: *Radio waves, *Echo ranging, Magnetic fields, Diurnal variations, Wave characteristics, Solar disturbances, Intensity, Scattering.

Correlation analyses of certain aspects of anomalous transequatorial backscatter echoes have been carried out. These features are the starting time, duration and strength of the echo. No significant correlation exists between any of the above features and solar or magnetic disturbance effects. Echoes which commence early in the afternoon tend to be stronger and to last far longer than those which commence later. Days in which the echoes have similar duration or starting time or strength tend to be grouped together. (Author)

AD-294 605 Div. 8, 2
(TISTP/GRW) OTS price $2.60

Queensland U. (Australia).
TRANSEQUATORIAL PROPAGATION ANALYSIS: IONOSPHERIC HEIGHT AND FREQUENCY PLOTS,
by J. A. Thomas. Mar 62, 23p. incl. illus. 8 refs. (Scientific rept. no. 8)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-345) Unclassified report

DESCRIPTORS: *Ionospheric propagation, *Radio communication systems, Experimental data, Wave transmission, Terrestrial magnetism, Australia, High frequency.

A method of obtaining ionospheric data representative of regions where no ionosondes exist is described, and base height and critical frequency plots for the F sub 2 region are determined for a variety of great circle paths through Brisbane. The existence of ionospheric tilts capable of giving anomalous propagation of HF waves is demonstrated and several factors controlling the propagation conditions are discussed. (Author)

AD-294 606 Div. 8, 2
(TISTP/WH) OTS price $1.10

Queensland U. (Australia).
LUNAR CONTROL OF ABNORMAL TRANSEQUATORIAL PROPAGATION,
by J. A. Thomas. Mar 62, 6p. incl. table, 13 refs. (Scientific rept. no. 9)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-346) Unclassified report

DESCRIPTORS: *Moon, *Diurnal variation, *Ionospheric propagation, Tides, Radio communication systems, Periodical variations.

Lunar tidal analyses of the starting time, intensity and duration of anomalous transequatorial back-scatter echoes were carried out. Semi-diurnal lunar variations in starting time and duration are found, and an hypothesis is proposed to explain the observed phase of these variations. (Author)

AD-294 607 Div. 8, 25
(TISTP/WH) OTS price $4.60

Queensland U. (Australia).
TRANSEQUATORIAL PROPAGATION ANALYSIS: RAY TRACING AND MODE ANALYSIS,
by J. A. Thomas and B. A. McInnes. Mar 62, 46p. incl. illus. tables, 16 refs. (Scientific rept. no. 10)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-347)
Unclassified report

DESCRIPTORS: *Ionospheric propagation, *Radio waves, *Ionosphere, Analysis, Refraction, Electromagnetic waves.

Two methods of ray-tracing are used for the analysis of transequatorial propagation. A graphical method proved too inaccurate and was replaced by a computational method, suitably modified to take account of tilted ionospheric regions. It is found that paths involving low ray elevation angles are more likely to provide the long-range anomalous echoes detected, and the chief mechanism is that of reflection from ionospheric tilts particularly prevalent in equatorial regions during the early evening hours. Mixed-mode propagation of back-scattered signals must be fully considered in any attempt to account for the intensity of echoes received. Horizon-focussing effects must be considered in deriving the field strength of radio signals at great distances. (Author)

AD-294 609 Div. 8, 2
(TISTP/JW) OTS price $10.50

Queensland U. (Australia).
FURTHER RESULTS OF OBSERVATIONS OF FIELD-ALIGNED IRREGULARITIES FROM BRISBANE,
by Evelyn M. Matthew. Mar 62, 140p. incl. illus. tables, refs. (Scientific rept. no. 12)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-349)
Unclassified report

DESCRIPTORS: *Echo ranging, *Geophysics, Diurnal variations, Ionospheric propagation, Reflection, Radio communication systems, Wave transmission, Terrestrial magnetism, Australia, Magnetic fields.

Results of an investigation into the characteristics and behaviour of echoes from F-region field-aligned irregularities as observed at 16 mc/s from Brisbane over the period August, 1960 to August, 1961, are discussed. The echoes (classified as patch or U-echoes) were observed either by direct reflection ('short-range' echoes) or as 'long-range' echoes, either by intervening reflections from the F-region and ground, or by direct reflection at times of steep horizontal ionospheric gradients. The diurnal variation of FAE occurrence was related to prevailing ionospheric conditions, long-range echoes occurring at times when foF2 is high and h'F is low, and short-range echoes when foF2 is low and h'F is high. U-echoes typically showed azimuthal spreads 20 degrees greater than those of patch echoes. U-echoes were found to occur preferentially at times of magnetic disturbance; magnetic control of sense of motion (northwards with increasing magnetic disturbance), and of range-spread (decreasing with increasing disturbance) was observed. (Author)

AD-294 622 Div. 8
(TISTE/OHD) OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
RESEARCH ON STORAGE TARGETS FOR CAMERA TUBES.
Interim engineering rept. no. 1, 1 July-1 Nov 62,
by G. W. Goetze and A. H. Boerio. 7 Jan 63, 12p. illus. refs. (Research rept. no. 62-912-253-R1)
(Contract AF 33(657)8676)
Unclassified report

DESCRIPTORS: *Camera tubes, *Image intensifiers, *Targets, Photomultipliers, Aluminum compounds, Aluminum, Oxides, Metal films, Thin films, Potassium compounds, Chlorides, Cesium alloys, Antimony alloys.

The performance of a camera tube, especially its sensitivity, can be improved by employing a means of multiplying the electronic charge emitted by the photocathode in response to radiation prior to storage and subsequent scanning for readout. One possible approach of achieving such a pre-beam gain is the use of electron bombardment induced conductivity (EBIC) in a thin layer of an insulator or semiconductor. The basic problems encountered with this type of target are briefly reviewed and summarized. Another method of achieving prebeam gain is by secondary electron emission and conduction (SEC) in a porous layer of a suitable insulator. Because of promising results obtained with this type of target in a parallel program, effort was concentrated on the low density KCl-target. A description of the mode of operation and the expected and achieved performance of these targets is given. In order to evaluate target performance in a sealed off tube containing a caesium antimony photocathode, such a tube was built and evaluated. (Author)

AD-294 655 Div. 8
(TISTE/OHD) OTS price $11.50

Motorola, Inc., Phoenix, Ariz.
COMPATIBLE TECHNIQUES FOR INTEGRATED CIRCUITRY.
Quarterly rept. no. 5, 1 May-31 July 62.
31 July 62, 154p. incl. illus. tables.
(Contract AF 33(616)8276)
Unclassified report

DESCRIPTORS: *Packaged circuits, *Microminiaturization (Electronics), *Molectronics, *Semiconductors, Chemical milling, Hydrochloric acid, Semiconducting films, Vapor plating, Hydrogen, Temperature, Gallium compounds, Arsenides, Thin films, Resistance, Dielectric films, Aluminum compounds, Silicon compounds, Resistors, Oxides, Capacitors, Radiofrequency coils, Electrodeposition, Tin compounds, Electric connectors, Aluminum, Printed circuits, Switching circuits, Electronic circuits, Amplifiers, Ultrahigh frequency, Radio receivers, Radiofrequency oscillators.

Effort was spent in developing process techniques which are necessary for integrated circuit fabrication. This effort has been both in morphological areas and thin films as applied to semiconducting substrate. Further efforts in perfecting epitaxial techniques are reported. A program has been started to develop and fabricate typical circuits which are practical for a wide range of high and low frequency amplifier applications as well as logic circuits. (Author)

AD-294 663 Div. 8, 30
(TISTP/JW) OTS price $1.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
FREQUENCY SYNTHESIZER A METHOD OF FREQUENCY CONTROL BY DIGITAL CONVERSION.
Foundational Research Rept.,
by C. Halko and J. Rawley. 18 Dec 62, 18p. incl. illus. (Rept. no. NADC-EL-6272)
Unclassified report

DESCRIPTORS: *Generators, *Frequency, Coding, Errors, Very high frequency, Digital computers, Feasibility studies, Electronic circuits, Microminiaturization (Electronics), Control systems.

A study was initiated to develop a frequency synthesizer to replace present day spectrum generators. The design objectives were to minimize spurious signal outputs, eliminate mechanical components, and to incorporate electronic

circuitry compatible with micro-miniaturization techniques. A method of frequency control was developed, using counters and logic circuits to develop a highly accurate coded error to connect to a variable frequency oscillator. A breadboard model was constructed, which was capable of preselecting any discrete frequency within the range from 2.0 to 3.0 mc with a theoretical accuracy of ±1 count. The frequency control techniques generate an output signal from a single vfo which minimizes the generation of spurious outputs. By changing only the vfo and mixer stages, these frequency control systems are capable of providing a standard by which it is possible to obtain a band of discrete frequencies over the entire r-f spectrum. (Author)

AD-294 685 Div. 8, 25
(TISTE/OHD) OTS price $5.60

Oklahoma U. Research Inst., Norman.
TEMPORAL PROFILES OF CONDUCTIVITY IN THE ELECTRIC SHOCK-TUBE.
Master's thesis
by Thaddeus Baynard Welch, Jr. 1962, 50p. incl. illus. tables, 5 refs.
Unclassified report

DESCRIPTORS: *Plasma physics, *Discharge tubes, *Wave transmission, *Electric discharges, Capacitors, Electronic switches, Electrodes, Partial differential equations, Theses, Microwaves, Interferometers, Helium, Argon, Voltage.

The original intent was to determine plasma properties by using microwave diagnostic techniques. In particular, electron densities and plasma frequencies were to be calculated at various points in the shock tube using helium and argon gases, with voltage and pressure as parameters. As experimental data was collected and analyzed, it became apparent that this goal would be achieved only within certain limits. However, within these limits, the theory proved sound and a general description of the density and distribution within the shock could be calculated. The method to determine the profile of the electron gas shock structure was to use microwaves employing the fringe technique as set forth by Wharton. Various factors influenced the amplitude and existence or non-existence of these fringes. The dominant parameter was voltage level, with pressure and type of gas being less important within the pressure range of the experiment. It was observed that with helium gas, regardless of the pressure, fringes appeared when voltages of 2, 3 and 4 kv were used. five and 6 kv appeared to be transition voltages with the fringes more likely to occur at pressures higher than 2 mm of mercury. At voltages above 7 kv, fringes seldom, if ever, appeared regardless of pressure. (Author)

AD-294 698 Div. 8, 2
(TISTP/JW) OTS price $2.60

Queensland U. (Australia).
OBSERVATIONS OF FIELD-ALIGNED IRREGULARITIES AND TRANSEQUATORIAL PROPAGATION.
Final rept.,
by J. A. Thomas, E. W. Dearden and others.
Mar 62, 17p. 22 refs. (Scientific rept. no. 16)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-353)
Unclassified report

DESCRIPTORS: *Ionospheric disturbances, *Radio waves, Radar echo areas, Van Allen radiation belt, Scintillation counters, High frequency, Sensitivity, Detection, Backward-wave oscillators, Australia, Propagation.

The work carried out at Brisbane in connection with investigations of field-aligned irregularities in the ionosphere and trans-equatorial propagation of radio waves is summarized. Information is given regarding the extent of such irregularity patches, their movements and the correlations of the observed radar echoes from these irregularities with other ionospheric and geophysical phenomena. An association is proposed between large E-W elongated bands of the irregularities, Van Allen outer belt radiation counts and an F-region anomaly already associated with the observation of red airglow arcs. The scintillation of radio transmissions passing through the irregularities at directions close to the field direction is probably the most sensitive means of detection of such irregularities. Anomalous trans-equatorial propagation of H.F. signals is associated with tilted reflection of very low angle radiation and occurs near the time of passage of the evening equatorial rise in F-region heights. At mid-latitude stations, an intervening normal 1F hop before the anomalous propagation hop may well exert a controlling influence on the use of this type of propagation. (Author)

AD-294 699 Div. 8, 2, 20
(TISTP/JW) OTS price $3.60

Queensland U. (Australia).
RADAR OBSERVATIONS OF FIELD-ALIGNED IRREGULARITIES DURING THE TWO MAGNETICALLY DISTURBED DAYS, MAY 6TH, 1960 AND MAY 8TH, 1960,
by Evelyn M. Matthew and E. W. Dearden. Mar 62, 1v. incl. illus. refs. (Scientific rept. no. 15)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-352) Unclassified report

DESCRIPTORS: *Ionospheric disturbances, *Van Allen radiation belt, Radar, Magnetic fields, Wave transmission, Radiation effects, Australia, Diurnal variations.

Further evidence is presented for an association, postulated by Dearden (1962), between the Outer Van Allen Belt, the FAI arcs observed from Brisbane, and the 6300 A airglow arcs. The phenomena associated with a discontinuous increase in the northward speed of an FAI arc are studied and the event is interpreted as arising from some form of impact on the magnetosphere. The occurrence of an annular echo and its associated phenomena is interpreted as an observation of the Outer Belt dumping radiation into the atmosphere. (Author)

AD-294 700 Div. 8, 2
(TISTP/JW) OTS price $1.60

Queensland U. (Australia).
FIELD-ALIGNED IRREGULARITIES IN THE Es REGION,
by G. L. Goodwin and J. A. Thomas. Mar 62, 16p. incl. illus. tables, 22 refs. (Scientific rept. no. 14)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-351) Unclassified report

DESCRIPTORS: *Echo ranging, *Frequency, Terrestrial magnetism, Ionospheric disturbances, Radio waves, Australia, Diurnal variations.

A comparison of the known diurnal and seasonal behavior of constant height (E sub sc) and sequential (E sub ss) sporadic-E echoes with that of field-aligned (E sub d) echoes from the E-region indicated that an increase in occurrence of E sub d echoes generally coincided with an

increase in occurrence and/or range spreading of E sub sc echoes, but was independent of the presence of E sub ss echoes. A detailed comparison indicated that at night in October and in day- and night-time in December almost all E sub sc clouds detected at frequencies at least down to 2.5 Mc/s have irregularities which are field-aligned. (Author)

AD-294 704 Div. 8, 15, 6
(TISTP/TL) OTS price $1.10

RAND Corp., Santa Monica, Calif.
A PRODUCT THEOREM FOR HILBERT TRANSFORMS,
by E. Bedrosian. Dec 62, 7p. incl. illus. 7 refs. (Memo. no. RM-3439-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Integral transforms, *Communications theory, Bessel function, Functional analysis, Real variables, Functions, Topology, Detection.

A mathematical theorem is presented for finding the Hilbert transform of a product of functions in a simplified fashion, under certain conditions. Engineering applications are discussed. (Author)

AD-294 715 Div. 8, 26
(TISTE/CRJ) OTS price $3.60

Sylvania Electric Products, Inc., Waltham, Mass.
ACTIVE THIN-FILM TECHNIQUES MICROMIN PROGRAM.
Interim development rept. no. 2, 23 Sep-22 Dec 62,
by Egons Rasmanis and James Cline. 14 Jan 63, 33p. incl. illus. tables, 6 refs. (Rept. no. 0445-2)
(Contract NObsr-87633, Proj. SR 008-03-03)
Unclassified report

DESCRIPTORS: *Diodes, *Transistors, *Thin film, *Semiconducting films, Vapor plating, Vacuum systems, Surfaces, Semiconductors, Manufacturing methods, Production, Microscopy, Single crystals, Crystal structure, Electrical properties, Nucleation, Resistance, Hall effect, Measurement, Life expectancy, Evaporators, Growth, Crystals, Processing.

Research was continued to develop a process for depositing device-quality silicon and/or germanium films on polycrystalline insulating substrates by vacuum evaporation of silicon and/or germanium, then to form diodes and transistors in these films. The ultra-high vacuum evaporator was installed in the laboratory and a total of 29 silicon depositing runs were made. The results of high-magnification optical examination of the silicon films for surface structure are encouraging. Optical studies and Hall Effect measurements were carried out on silicon films produced by pyrolytic deposition, and vacuum deposition. (Author)

AD-294 768 Div. 8
(TISTE/CRJ) OTS price $1.00

Motorola, Inc., Phoenix, Ariz.
MINIATURE THIN-FILM INDUCTORS.
Final rept., 1 June 61-1 Dec 62,
by F. R. Gleason. 1 Dec 62, 33p. incl. illus. tables (Rept. no. SSF-2631)
(Contract NObsr-85397, Proj. SR-0080302)
Unclassified report

DESCRIPTORS: *Coils, *Miniature electronic equipment, *Manufacturing methods, Thin films, Metal films, Ferromagnetic materials, Inductance, Measurement, Production, Processing, Ferrites.

Research was continued on the fabrication of miniature thin film inductors using flat spiral conducting paths in combination with high-permeability ferrite material. Two approaches to the problem were investigated. The first used copper spiral conducting paths and bulk ferrite wafers with an intrinsic initial permeability of 190 and a Q-value of 200 as measured at a frequency of 1 mc per second. The second method proposed the use of noble metal conductors which were surrounded by a medium of thick ferrite film. The ferrite film was deposited by a pyrohydrolytic spray technique which was compatible with the use of the noble metals as the spiral conducting path. The goal of the program was to obtain inductors with values from 38 microhenries to 1 millihenry with a minimum Q-value of 100 as measured at a frequency of 1 mc. The largest inductance value obtained using the bulk ferrite was 153 microhenries with a Q-value of 20. The inductance values that were obtained were found to be limited by an air gap in the magnetic path produced in the bulk ferrite assembly. Described are various methods studied for obtaining ferrite thick films with usable magnetic properties. The method that proved to be most useful was the pyrohydrolytic spray of a chloride solution of the desired metal cations.

AD-294 771 Div. 8, 5
(TISTM/RGR) OTS price $.50

Watkins-Johnson Co., Palo Alto, Calif.
RESEARCH AND INVESTIGATION OF MATERIALS FOR LASER APPLICATIONS.
Interim engineering rept. no. 2, 1 Oct-31 Dec 62,
by R. Fitzpatrick and S. E. Sobottka. 31 Dec 62, 15p. incl. illus. 7 refs. (Rept. no. W-J 63-612R8)
(Contract AF 33(657)8917)
Unclassified report

DESCRIPTORS: *Semiconductors, *Lasers, *Germanium compounds, Diodes, Single crystals (Metallurgy), Intermetallic compounds, Neodymium, Luminescence, Germanium alloys, Optics, Low temperature research, Laboratory equipment, Excitation, Chemical analysis, Processing, Feasibility studies, Arsenides.

During the past quarter, techniques have been developed for fabricating germanium arsenide(GA) diodes. One diode was made from a GA crystal containing neodymium and its electroluminescence characteristics measured at several temperatures. Normal zinc-doped GA luminescence was observed, but no neodymium emission lines were seen. Absorption and fluorescence measurements on the same material also failed to reveal neodymium lines. Rough calculations indicated that the neodymium concentration may have to be considerably higher than could have existed in that material before significant neodymium emission can be seen. Diffusion doping of GA and germanium alloys with neodymium are now being studied. (Author)

AD-294 788 Div. 8, 26
(TISTE/CRJ) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
DESIGN CONSIDERATIONS FOR MICROWAVE GERMANIUM TUNNEL DIODES,

by L. Wandinger and K. Klohn. Sep 62, 14p. incl. illus. tables, 7 refs. (AELRDL technical rept. 2318)

Unclassified report

DESCRIPTORS: *Diodes, *Semiconductors, *Manufacturing methods, Microwave equipment, Measurement, Negative resistance circuits, Production, Encapsulation, Electroforming, Chemical milling, Resistance, Surface properties, Processing, Germanium.

A discussion is presented on the technology and problems involved in the design considerations, fabrication, and measurement of germanium tunnel diodes. Fabrication includes material preparation, methods of creating abrupt p-n junctions such as dot alloying, electrical forming or pulse discharge forming and solution growth, etching procedures necessary to obtain low peak currents and high peak-to-valley current ratios, and packaging considerations for low series inductance. Measurement techniques to determine the important high-frequency parameters, RS, LS, C, and RN, of the diode are discussed. The results of experimental units exhibiting cutoff frequencies up to 5 gc are tabulated. (Author)

AD-294 795 Div. 8
(TISTE/OHD) OTS price $5.60

Radio Corp. of America, Harrison, N. J.
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
Interim development rept. no. 2, 1 Sep-30 Nov 62
by G. Hodowanec, C. Bacher, and R. McMurrough.
31 Dec 62, 51p. incl. illus. 6 refs.
(Contract NObsr-87535, Proj. SR 008-03-4)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Microwave amplifiers, Limiters, Detectors, Countermeasures, Waveguide couplers, Helixes, Antennas, Electron guns, Focusing, Electron optics, Electron beams, Magnets, Video amplifiers, Noise (Radio), X band.

The major effort was placed upon the experimental evaluation of the various design approaches and techniques proposed for obtaining a simple, but reliable, tube design meeting the objective specifications of the program. Some preliminary tests were performed in bell-jar vacuum systems, but the major emphasis was placed on experimental glass tube structures which could be properly baked-out and evacuated. Mechanical problems have delayed the full evaluation of the compression-sheath-supported helix structures. The fabrication of interim tubes in which the final design helix structures are supported directly in precision-bore glass are being expedited in order to complete the evaluation of the proposed design for the microwave-amplifier section of the tube. Initial evaluations of the proposed design of the video section have been promising, especially from the viewpoint of the dynode characteristics and dynode life. Experimental metal-ceramic subassemblies have been made and mechanically evaluated. The techniques being established are being applied initially to the novel video section of the final tube design. The experimental periodic-permanent-magnet focusing structure, which was originally only intended for use with the exploratory glass tubes, was found to be also suitable for use with the prototype tubes. (Author)

AD-294 829 Div. 8
(TISTE/CRJ) OTS price $1.60

Electronic Communications, Inc., Timonium, Md.
PROTOTYPE HIGH POWER CIRCULATOR.
Interim engineering rept., 20 Oct 62-20 Jan 63,
by Marvin Cohn, A. F. Eikenberg and others.
20 Jan 63, 10p. incl. illus.
(Contract NObsr-87394)
Unclassified report

DESCRIPTORS: *Waveguides, Transmission lines, Ferroelectric materials, Dielectric properties, Radiofrequency power, Temperature, Measurement, Packaging, Ultra high frequency, Current limiters, Test methods, Design.

Efforts were concerned with modifying the existing UHF Y-circulator into a unit which will be suited for mounting in a standard 19-inch relay rack. Emphasis will be placed on compactness and simplicity of operation. Packaging of the entire circulator system was started. All components are being mounted in a standard 19-inch relay rack which measures 47 1/2 inches high x 22 inches deep. The 3 1/8-inch co-ax input port for the transmitter connection; and the 3 1/8-inch co-ax output port for the antenna connection are located opposite each other on the outside of the cabinet. The receiver connection is mounted on the front panel. New samples of a non-linear dielectric were measured and found to have characteristics which are suitable for use in a ferroelectric limiter. These results were obtained using a low-power RF signal. The application of a high-power RF signal will determine the operating characteristics of a limiter using this material. (Author)

AD-294 847 Div. 8, 26
(TISTE/CRJ) OTS price $8.10

Radio Corp. of America, Somerville, N. J.
INDUSTRIAL PREPAREDNESS STUDY ON DEVICES 13, 14, 15. EXTENDED LIFE TEST 8000 HOUR DATA REPORT,
by J. Wright, ed. by M. B. Alexander. Nov 62,
78p. incl. illus. tables.
(Contract DA 36-039-sc-72709)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Semiconductors, Silicon, Temperature, Life expectancy, Stresses, Reliability, Storage, Production.

Research was continued on the effects of temperature and power dissipation stresses on silicon power transistors out to 8000 hours. The extended life test program was completed involving type 2N1484 at the 8000-hour interval and types 2N1480 and 2N1488 at the 1000-hour interval. Static operating circuits are shown. The 8000-hour 2N1484 data is shown for seven temperature levels and four operating power levels. The 1000-hour data (2N1480, 2N1488), for correlation purposes, is shown at one operating power level each. (Author)

9. FLUID MECHANICS

AD-293 833 Div. 9, 25
(TISTP/JW) OTS price $1.60

Technical U., Copenhagen (Denmark).
THE CORRELATION BETWEEN EARTH CURRENTS AT GODHAVN AND MAGNETIC DISTURBANCES,
by Eigil Ungstrup and Bent Moller Petersen.
1 June 62, 1v. incl. illus. tables, refs. (Technical note no. 1; rept. no. 10)
(Contract AF 61(052)298)
(ARCRL 62-1139) Unclassified report

DESCRIPTORS: *Earth, *Ionosphere, Greenland, Voltage, Electric currents, Soils, Moisture, Ionospheric disturbances, Magnetic effects, Measurement.

From a detailed treatment of a series of provisional earth current measurements made at Godhavn, Greenland, it is shown that it is possible, with some caution, to use earth current measurements instead of magnetic measurements as indicators of ionospheric activity. (Author)

AD-293 890 Div. 9, 25, 30, 8
(TISTP/JW) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
TRANSMISSION OF INFORMATION THROUGH AN ARTIFICIALLY IONIZED ATMOSPHERE,
by R. A. Shatas. 12 Dec 62, 12p. 7 refs. (Rept. no. RR-TR-62-10)
Unclassified report

DESCRIPTORS: *Data transmission systems, *Communication systems, Ionization, Simulation, Electromagnetic wave reflections, Microwaves, Absorption, Plasma physics, Kinetic theory, Electromagnetism, Atmospherics.

Electromagnetic communications through an artificially ionized terrestrial atmosphere are reported. If the tolerated interruption in the communications link should not exceed a fraction of a second after the ionizing event, coherent narrow band light receivers and transmitters in the wavelength region between 1 and 100 microns are recommended. These conclusions were based on the computation of the critical frequency of a hot terrestrial atmosphere. To describe the absorption of electromagnetic radiation in the wavelength region of interest, resonant and nonresonant microwave absorption theories have been extended to higher frequencies. Communications links which can tolerate substantial interruptions after the ionizing event can operate in the microwave wavelength region. The duration of the interruption is determined by the kinetics of atmospheric plasmas. The rate equations for such plasmas were derived and some of the coefficients determining the decay were computed on a quantum mechanical basis. (Author)

AD-293 893 Div. 9, 25, 12
(TISTP/JW) OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
THERMAL IONIZATION AND ELECTRONEGATIVE SPECIES,
by A. E. Fuhs. 21 Sep 62, 37p. incl. illus. table, 6 refs. (Rept. no. TDR-169(3153)TN-2)
(Contract AF 04(695)169)
(BSD TDR 62-238) Unclassified report

DESCRIPTORS: *Ionization, *Electromagnetic waves, Plasma physics, Attenuation, Reflection, Rockets, Exhaust gases, Thermal radiation, Re-entry aerodynamics.

Free electrons that are present in the ionized gas of the re-entry plasma sheath or the exhaust of rockets cause severe attenuation and reflection of electromagnetic waves. A frequently proposed solution to the resultant communication problem is the addition of trace amounts of an electronegative species. The conditions which are favorable or unfavorable for ''soaking up'' electrons are examined. The work of Sanochkin is extended to include thermal ionization in gas mixture with electronegative species. A model gas is used where each species is characterized by its ionization potential or its electron affinity. The degree of ionization and the ratio of electron density with and without additives have been calculated as a function of kT with pressure and mole fraction of additives as parameters. When ionization potential and electron affinity are equal, electrons are absorbed efficiently up to kT of about I/10. When ionization potential exceeds the electron affinity, the efficiency for free electron removal decreases markedly. (Author)

AD-293 978 Div. 9
(TISTP/JW) OTS price $2.60

Army Materials Research Agency, Watertown, Mass.
THERMODYNAMICS OF INTERSTITIAL SOLID SOLUTIONS WITH REPULSIVE SOLUTE-SOLUTE INTERACTIONS,
by Kenneth A. Moon. Dec 62, 20p. incl. illus. tables, 21 refs. (MRL rept. no. 127)
(DA Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Thermodynamics, *Solids, Entropy, Reliability, Hydrogen compounds, Chemical properties, Solubility, Fluid flow, Statistical analysis, Solutions.

The quasichemical treatment published in 1937 by Lacher is recommended as the best available statistical treatment of interstitial solutions. It is shown that the quasichemical method is exact in certain important cases, and the error in other cases is discussed. An expression for the excess entropy of interstitial solutions with excluded sites is derived from the quasichemical expression. The conditions of reliability of this expression, and of other simplified treatments which have previously appeared, are evaluated by comparison with the quasichemical result. An analysis is given of the excess partial entropy of hydrogen in V-H, Nb-H, and Ta-H solutions. (Author)

AD-294 191 Div. 9, 25
(TISTP/JW) OTS price $3.60

Aeronautical Research Labs., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
ON SURFACE MASS TRANSFER EFFECTS IN A BINARY FLUID.
Report on Mathematical Techniques of Aeromechanics,
by Arthur N. Tifford. Aug 62, 32p. incl. illus. 19 refs. (Rept. no. ARL 62-396)
(Proj. 7071)
Unclassified report

DESCRIPTORS: *Boundary layer, *Fluid flow, Turbulence, Surfaces, Gases, Pressure, Viscosity, Heat transfer, Fluid mechanics.

A relatively basic study of surface mass transfer effects in a non-reacting binary fluid was conducted. The more significant findings are: At least one of the surface boundary conditions employed in the extensive analytic boundary layer literature on the subject is generally an incorrect representation of the physical conditions actually existing at the surface. A reformulation rectifying this deficiency is recommended. The concept of a volumetric displacement mechanism of effectiveness of injected low molecular weight gases, previously found by the author to be appropriate for zero pressure gradient boundary layers in a steady flow field, is applicable no matter whether the flow fields be steady or unsteady, potential or viscous, creeping or boundary layer, etc. Aerothermochemical similarity is a fundamental attribute of turbulence with light-gas injection. (Author)

AD-294 192 Div. 9
(TISTA/GEC) OTS price $7.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HYPERSONIC SHOCK LAYER AT LOW REYNOLDS NUMBER. THE YAWED CYLINDER,
Rept. for Jan-Sep 61,
by H. K. Cheng and A. L. Chang. Oct 62, 59p. incl. illus. 57 refs.
(Contract AF 33(616)7812, Proj. 7064)
(ARL 62-453) Unclassified report

DESCRIPTORS: *Cylindrical bodies, Yaw, Shock waves, Superaerodynamics, Aerodynamics, Theory, Vortices, Aerodynamic data, Viscosity, Partial differential equations, Boundary layer, Hypersonics.

Low-density hypersonic flows are studied theoretically using the concept of a thin shock layer. The approach is applied to the problem of a cylinder at yaw, and to the analyses of vorticity interaction in the stagnation region for both axisymmetric and plane flows. A detailed discussion of the basic flow model is also made. Numerical solutions are obtained for yawed cylinders in the leading-edge region. The calculation encompasses a regime of rarefaction corresponding to both small and large departures from the boundary-layer solutions, and covers a range of sweep angle from 0 to 60 degrees. Solutions obtained reveal the existence of an independence principle which provides a way of correlating flow fields around cylinders at different yaw angles and Reynolds numbers. For the higher Reynolds number regime (which includes the vorticity-interaction as well as the viscous-layer regimes) vorticity-interaction theories based on the boundary-layer approximation are shown to be applicable in the stagnation region for both axisymmetric and plane flows. The results obtained are compared with results from other theories, and their differences are examined. (Author)

AD-294 193 Div. 9, 25
(TISTP/JW) OTS price $10.10

Institute of Engineering Research, U. of Calif., Berkeley.
THE INFLUENCE OF SHOCK WAVE-BOUNDARY LAYER INTERACTION ON HEAT TRANSFER TO AN AXISYMMETRIC BODY.
Report on Aerothermodynamic Investigations in High Speed Flow,
by R. S. Hickman. Oct 62, 110p. incl. illus. tables, 22 refs.
(Contract AF 33(616)6161, Proj. 7064)
(ARL 62-442) Unclassified report

DESCRIPTORS: *Shock waves, *Heat transfer, Mach number, Reynolds number, Wind tunnels, Pressure, Cooling, Cylindrical bodies, Hemispherical shells, Boundary layer, Fluid flow.

The local heat flux to hemisphere cylinder models was measured in the low density wind tunnel. Two different methods were developed and five individual models were tested. Data were obtained throughout the Mach number range of 2 to 6 with Reynolds numbers behind the shock varying from 38.5 to 1720. The stagnation point data were found to agree with continuum boundary layer theory at the higher Reynolds numbers and with Van Dyke's second order boundary layer theory at the lower Reynolds numbers. In addition, the pressure distribution was measured on cooled and uncooled models and was found to agree well with modified Newtonian theory throughout the Reynolds number range. Local recovery factors were also measured over the test Mach number range. A slight slip effect was found to exist near the stagnation point for low Reynolds numbers. (Author)

AD-294 335 Div. 9
(TISTA/FRL) OTS price $2.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
UNSTEADY SUPERSONIC FLOW OVER A CONE WITH A BLUNTED TIP (Nestatsionarnoe Sverkhzvukovoe Obtekanie Konusa s Okruglennoi Vershinoi),
by G. F. Telenin and G. P. Tinyakov. Dec 62 24p. incl. illus. 2 refs. (Trans. no. TR-24 from Izvestiya Akademii Nauk SSSR, OTN Mekhanika i Mashinostroenie, No. 2, 1961)
Unclassified report

DESCRIPTORS: *Blunt bodies, Conical bodies, Oscillation, Moments, Equations, Pressure, Drag, USSR, Supersonics, Supersonic flow.

Equations are derived for determining the flow characteristics for blunted tip cones in an unsteady supersonic flow. Included are equations for the aerodynamic moments acting on an oscillating body in supersonic flow.

AD-294 378 Div. 9, 25
(TISTP/JW) OTS price $7.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
EXACT SOLUTIONS FOR MAGNETOHYDRODYNAMIC CHANNEL FLOWS,
by A. Sherman. Dec 62, 67p. incl. illus. 19 refs. (Rept. no. R62SD991)
(Contract AF 49(638)914)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Reynolds number, Magnetic fields, Velocity, Distribution, Secondary emission, Heat, Fluid flow, Equations.

Simplified MHD Channel Flow problems for which exact solutions can be found are discussed. Both steady state and transient problems are considered, and account is taken of heat flux as well as velocity distributions. Secondary flows are also discussed. The bulk of the solutions are valid for arbitrary Magnetic Reynolds numbers, although some channel flows with non-uniform magnetic fields and small Magnetic Reynolds numbers are discussed. (Author)

AD-294 380 Div. 9, 25
(TISTP/JW) OTS price $1.60

Mitre Corp., Bedford, Mass.
FURTHER STUDIES ON THE DIFFRACTION OF A PRESSURE WAVE BY AN ELASTICALLY LINED CYLINDRICAL CAVITY IN AN ELASTIC MEDIUM,
by M. L. Baron and R. Parnes. Sep 62, 16p. incl. illus. tables, 5 refs. (Special rept. no. SR-72)
(Contract AF 33(600)39852, Proj. 607)
Unclassified report

DESCRIPTORS: *Diffraction, *Ground effect, Cylindrical bodies, Hemispherical shells, Elasticity, Pressure, Stiffened cylinders, Stresses, Underground explosions, Solids, Shock waves.

Studies are presented on the diffraction of a

pressure wave in an elastic medium by a cylindrical cavity with an elastic liner. The elastic properties of the shell are different from those of the surrounding medium. A parametric study of the influence of both the elastic properties of the medium and the steel shell stiffness on the intensity of the hoop stresses is included. It shows that the use of a stiff shell in a soft medium produces a reduction in the hoop stress which has practical significance. These results can be used for design purposes for underground cavities located in competent rock subjected to air induced ground shock in the superseismic region of nuclear explosions. (Author)

AD-294 384 Div. 9
(TISTA/FRL) OTS price $2.50

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
DYNAMIC RESPONSE OF SHELLS TO EXTERNALLY APPLIED DYNAMIC LOADS.
Final rept. on Nuclear Weapon Effects on Space Vehicles,
by John W. Leech, T. H. H. Pian and others.
Nov 62, 101p. incl. illus. tables, 20 refs.
(Rept. no. ASRL TR 87-3)
(Contract AF 33(616)6373, Proj. 6906)
(ASD TR 62-610) Unclassified report

DESCRIPTORS: *Structural shells, Plastic flow, Load distribution, Moments, Elasticity, Stresses, Non-linear differential equations, Aerodynamics, Perturbation theory, Beams, Rings, Numerical methods and procedures, Deflection, Spaceships, Deformation.

Step-by-step numerical methods for predicting the dynamic response of two- and three-dimensional structures are presented. Specifically, beams, rings and shells (restricted to axisymmetric deformations) are treated. Continuous structures are represented by a convenient two-flange lumped-parameter system and primary consideration is given to structures experiencing high intensity short duration impulsive loadings. The structural material is assumed to behave as an elastic, perfectly plastic solid and large deflection effects are provided for in the analysis. Experimentally determined transient responses of several explosively loaded beams (well into the plastic range) are compared with a numerical solution based on the above methods. (Author)

AD-294 411 Div. 9
(TISTA/GEC) OTS price $1.60

Aeronautical Research Inst. of Sweden.
AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF SECOND-ORDER WING-BODY INTERFERENCE AT HIGH MACH NUMBER,
by Peter G. Wilby. Aug 62, 16p. incl. illus. tables, 5 refs. (Technical note no. 6; Rept. no. 91)
(Contract AF 61(052)75)
Unclassified report

DESCRIPTORS: *Wing-body configurations, Aerodynamics, Interference, Theory, Pressure, Load distribution, Conical bodies, Triangular wings, Boundary layer, Hypersonics.

The second-order wing-body interference theory of Landahl and Beane (J. Aero. Sci., Vol. 27, No. 9 (Sept. 1960), p. 694-702) is used in the theoretical calculation of the pressure distributions over the wing of a wing-body combination. Results are compared with experimental values obtained from wind-tunnel tests, at a Mach number of 7.35, on a cone-cylinder non-lifting body with a triangular wing of wedge section set at incidences of 0, 3, 6 and 10 degrees. It is shown that interference effects can be very large and can be calculated theoretically with good accuracy. (Author)

AD-294 497 Div. 9, 8, 25
(TISTP/JW) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
HYDROMAGNETIC FLOW CHARACTERIZED BY STRONG INTERACTION,
by Enrico Levi. 21 Mar 62, 12p. incl. illus. 5 refs. (Research rept. no. PIBMRI-1012-62; Memo. no. 42)
(Contract AF 30(602)2149)
Unclassified report

DESCRIPTORS: *Hydrodynamics, *Magnetic fields, Plasma physics, Power transformers, Inductance, Electric currents, Nonlinear systems, Intensity, Electron bombardment, Fluid flow.

AD-294 508 Div. 9, 25
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF TEMPERATURE OF MEDIUM ON AMPLIFICATION FACTOR OF PHOTOELECTRONIC MULTIPLIER,
by Ye. L. Stolyarova, G. M. Suchkova, and L. S. Nesterova. 29 Nov 62, 7p. incl. illus. 8 refs. (Trans. no. FTD-TT-62-1515 from Pribory I Metody Analiza Izlucheniy, Moscow, Inzhenerno-Fizicheskii Institut 2:pp. 137-143, 1960)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Photoelectric materials, Temperature, Secondary emission, Heat exchangers, Metals, Energy, Translations, Amplifiers.

Results of a systematic examination into the dependenceof signal amplitude on temperature, obtained for three types of Soviet photoelectronic multipliers, are presented. (Author)

AD-294 527 Div. 9, 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL DETERMINATION OF THERMAL RADIATION CHARACTERISTICS DURING HEATING OF BODIES BY RADIATION IN A RAY TRANSPARENT MEDIUM,
by I. M. Maslennikov. 14 Nov 62, 13p. incl. illus. tables, 6 refs. (Trans. no. FTD-TT-62-1394 from Tezisy Dokladov I Soobshcheniy Na Soveshchanii Po Teplo I Massoobmenu, pp. 1-16, 5-9 June 61)
Unclassified report

DESCRIPTORS: *Thermal radiation, Heat transfer, Translations, Optics, Radiation effects, Density, Surfaces, Heat exchangers.

This method allows for a sufficiently rapid and accurate determination of optical characteristics of bodies participating in radiant heat exchange, angular radiation coefficients, surface density of the resultant radiant stream and surface intensity of heat accumulation. This method appears to be a further development of investigations by the school of academician

A.B.Lykov, and is based on modern ideas of the phenomenological theory of radiation and its application pertaining to problems of calculating radiant heat exchange in systems of gray bodies. This method differs from previously published analogous methods in several ways. (Author)

AD-294 548 Div. 9, 30
(TISTP/WH) OTS price $3.60

Bureau d'Analyse et de Recherche Appliquees (France).
ANALOG STUDY OF SOME PROBLEMS RELATIVE TO LIFTING SURFACES IN AN HELICOIDAL MOVEMENT.
Final rept.
1962. 28p. incl. illus.
(Contract N62558-2997)
Unclassified report

DESCRIPTORS: *Marine propellers, *Analog systems, *Fluid mechanics, Surfaces, Simulation, Water.

The first report defined the general principles of utilization and construction of an analog tank for studying the perturbation potential around lifting surfaces submitted to an helicoidal movement. The present report, which utilizes the same quotations, gives the results obtained with this tank in the resolution of various elementary problems. These determinations were used for the final setup of the analog model which can be considered as corresponding accurately to its anticipated function. (Author)

AD-294 602 Div. 9
(TISTA/GEC) OTS price $4.60

Rosemount Aeronautical Labs., U. of Minn., Minneapolis.
WIND TUNNEL INVESTIGATION OF AERODYNAMICS OF SLIPPER BEAMS AS MOUNTED ON A TYPICAL SUPERSONIC ROCKET SLED,
by Frederick Moynihan and Rudolf Hermann.
Oct 62, 33p. incl. illus. tables, 4 refs.
(Rept. no. RAL-RR-190)
(Contract AF 29(600)2839, Proj. 7856)
(AFOSR/DRA 62-19) Unclassified report

DESCRIPTORS: *Rocket propelled sleds, Aerodynamics, Supersonics, Wind tunnel models, Model tests, Pressure, Load distribution, Lift.

Results of wind tunnel measurements of lift and drag of slipper beams when mounted on a basic sled configuration are presented and discussed. The pressure distributions on the top and bottom of the sled body are also presented. Variables investigated were location of front slipper beam and front and rear slipper beam fairing shape. Mach number range was from 1.5 to 4. Simulated track cross section was that of the Air Force Missile Development Center at the Holloman Air Force Base, New Mexico. The results show that the slipper beam lift characteristics can predominate and by proper shape and location of the slipper beams, the overall sled lift can be effectively controlled. For example, the overall lift can be made negative over the whole Mach number range by using obviously negative lift fairings and by locating the front beam forward of the nose-body shoulder, and by placing the front beam at the shoulder the overall lift is approximately zero over the same speed range. (Author)

AD-294 629 Div. 9, 10, 15, 30
(TISTW/PCR) OTS price $3.60

Columbia U., New York.
STRESSES IN AN INCOMPRESSIBLE VISCO-ELASTIC PLASTIC THICK-WALLED CYLINDER,
by M. Shinozuka. Nov 62, 27p. incl. illus. 4 refs. (Technical rept. no. 15; Rept. no. CU-15-62 ONR 266(78) CE)
(Contract Nonr-26678, Proj. Nonr 064-446)
Unclassified report

DESCRIPTORS: *Stresses, *Cylindrical bodies, *Solid rocket propellants, Pressure, Numerical methods and procedures, Mathematical computer data, Programming, Computers, Computer logic, Digital computers, Relaxation time, Integrals, Integral equations, Operators (Mathematics), Solids, Mathematical analysis, Simulation.

A method of determining stresses and strains under the assumption of plane strain in an incompressible visco-elastic-plastic thick-walled cylinder subject to internal pressure is presented. For a material with deviatoric stress-strain relations characteristic of a standard solid, the numerical computation is carried out on the IBM digital computer 1620. (Author)

AD-294 638 Div. 9
(TISTA/FRL) OTS price $3.60

Instituto Nacional de Tecnica Aeronautica (Spain).
CHEMICAL NON-EQUILIBRIUM EFFECTS IN HYPERSONIC AERODYNAMICS,
by A. Linan and I. DaRiva. 1962, 31p. incl. illus. 32 refs.
(Contract AF 61(052)221 and Grant AF EOAR 62-91)
Unclassified report

Presented at the Third International Congress in the Aeronautical Sciences, 27-31 Aug 1962, Stockholm, Sweden.

DESCRIPTORS: *Aerodynamics, Recombination reactions, Dissociation, Boundary layer, Convection, Chemical reactions, Re-entry aerodynamics, Gas ionization, Gas flow, Heat transfer, Moments, Energy, Reaction kinetics, Flame propagation, Laminar boundary layer, Hypersonic flow.

The influence of chemical non-equilibrium on hypersonic flows is considered in the following cases: recombination and dissociation in the boundary layer. It is pointed out that since in the region of maximum convective heating, the outer inviscid flow is in equilibrium, departures from equilibrium occur only close to the wall, and this makes possible the obtention of a simple analytical solution in which the effects of arbitrary reaction rates, body shapes and flight regimes are clearly shown. Chemical reactions between the air constituents and any injected or vaporized material from the wall. In this case the assumption is made that the chemical reaction is so fast that it takes place in a very thin region. This simplifies the obtention of an analytical solution for finite reaction rate. A criterium for flame extinction is given. (Author)

AD-294 696 Div. 9
(TISTA/GEC) OTS price $3.60

Rome U. (Italy).
HEAT CONDUCTION IN BLUNT-SHAPED BODIES,

by Luigi Broglio. Sep 62, 28p. incl. illus. 2 refs. (Technical note no. 6; SIARgraph no. 64) (Contract AF 61(052)198)
Unclassified report

DESCRIPTORS: *Blunt bodies, Mathematical analysis, Partial differential equations, Theory, Aerodynamics, Thermal conductivity.

Research is described of eigenvalues and eigenfunctions to be used in connection with thermal problems, for the case of general elliptic coordinates. To particular cases spherical shells and parabolic shells can be studied. The reduction to ordinary equations and a method of solution for thin shells are also presented. (Author)

AD-294 697 Div. 9, 25
(TISTP/JW) OTS price $5.60

United Aircraft Corp., East Hartford, Conn.
ANALYSIS OF MAGNETOGASDYNAMIC GENERATORS HAVING SEGMENTED ELECTRODES AND ANISOTROPIC CONDUCTIVITY,
by J. Conrad Crown. Feb 61, 55p. incl. illus. 4 refs. (Rept. no. R-1852-2)
Unclassified report

DESCRIPTORS: *Fluid flow, *Electrical conductance, *Generators, Magnetic properties, Magnetohydrodynamics, Temperature, Pressure, Viscosity, Analysis, Reports.

The basic equations describing the two-dimensional steady inviscid flow of a magnetogasdynamic fluid with anisotropic electrical conductivity are transformed into a more convenient form by the introduction of a current flux function. A method is presented for determining the electrodynamic field variables when the gasdynamic variables (velocity, temperature, pressure, etc.) are constant. The method is sufficiently general that it may be applied to cases with arbitrary configurations and variable magnetic induction. The method is applied to the calculation of the field variables of a segmented-wall magnetogasdynamic generator with uniform applied magnetic induction. Results of typical calculations are presented. (Author)

AD-294 703 Div. 9
(TISTM/EJH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
SPECULATIVE CONSIDERATION ON HIGH-FREQUENCY INSTABILITY OF THE LAMINAR BOUNDARY LAYER AND ITS EFFECT ON THE DESIGN OF STABILIZING COATINGS,
by M. O. Kramer. Dec 62, 11p. incl. illus. 8 refs. (Memo. no. RM-3284-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Laminar boundary layer, *Aerodynamics, *Stabilization, High frequency, Stability, Coatings, Damping, Gas flow.

Recent theoretical work indicates the possibility of a high-frequency instability of the laminar boundary layer. Recent experimental findings provide evidence for the existence of a high-frequency instability of the laminar boundary layer. The critical frequency of the experimentally indicated high-frequency instability is approximately 40% of the free-stream velocity divided by the laminar-boundary-layer thickness or about 25 times the most critical frequency of the Tollmien-Schlichting waves. The wave length of the high-frequency instability is about 1.9 times the laminar-boundary-layer thickness or approximately 1/8 the wave length of the most critical Tollmien-Schlichting waves. The eddies resulting from the high-frequency instability are spaced much closer to the surface than to each other, which makes the damping of the high-frequency instability of the laminar boundary layer by an appropriate stabilizing coating a promising possibility. (Author)

AD-294 722 Div. 9
(TISTP/TL) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
UPPER AND LOWER BOUNDS FOR THE APSIDAL ANGLE IN THE THEORY OF THE HEAVY SYMMETRICAL TOP,
by J. B. Diaz and F. T. Metcalf. 4 Oct 62, 36p. 22 refs. (Rept. no. NOLTR 62-131; Mathematics Dept. rept. no. M-29)
Unclassified report

DESCRIPTORS: *Spheres, *Particles, *Gravity, *Azimuth, *Bodies of revolution, Inequalities, Kinetic theory, Potential theory, Convex sets, Functions, Theory, Surfaces, Motion, Vector analysis, Integrals, Differential equations.

A simple method is developed for obtaining upper and lower bounds for the apsidal angle which occurs in the theory of the heavy symmetrical top. This method is employed to give a quick derivation and an improvement of the upper and lower bounds obtained by W. Kohn. An advantage of the present method is the simplification which arises from eliminating the need for contour integration. The sharpness of the bounds is demonstrated, again without contour integration. The particular method in question is illustrated first in the theory of the spherical pendulum. (Author)

AD-294 769 Div. 9, 26
(TISTP/JW) OTS price $7.60

Solar, San Diego, Calif.
DEVELOPMENT OF MANUFACTURING METHODS FOR LIGHT-WEIGHT METAL FOIL HEAT EXCHANGERS.
Quarterly interim technical rept. no. 2, 18 Sep-17 Dec 62,
by L. A. Schlagel. 17 Dec 62, 1v. incl. illus. tables, refs. (Rept. no. ER 1245-4)
(Contract AF 33(657)8766, Proj. 7-936)
Unclassified report

DESCRIPTORS: *Heat exchangers, *Manufacturing methods, *Gases, Bonding, Pressure, Design, Welding, Metallurgy, Metals, Alloys, Materials, Foils, Analysis, Reports.

The work in the second quarterly period was in Phase I activities. These activities are planned to produce information which is required for the final heat exchanger designs. Modifications were made to various tools to experimentally develop the best methods for forming and joining metal foil materials. Experimental test samples were subjected to pressurization tests to evaluate the strength of the bonds and the design limitations. Improvements to the heat exchanger designs have resulted from analysis of the experimental work in forming, joining, and pressure testing. The literature survey and study of materials and coatings suitable for high temperature heat exchanger construction were completed. Analytical work was initiated to support the final designs for the heat exchanger ducting transitions, and manifolds. (Author)

Division 10 - FUELS AND COMBUSTION

AD-294 802 Div. 9, 25
(TISTP/WH) OTS price $3.60

Hydronautics, Inc., Laurel, Md.
ON THE PULSATION OF FINITE, VENTILATED CAVITIES,
by C. C. Hsu and C. F. Chen. Nov 62, 25p. illus. table, 6 refs. (Technical rept. no. 115-4)
(Contract Nonr-331900, Proj. SR 099-01-01)
Unclassified report

DESCRIPTORS: *Cavitation, *Resonance, *Hydrofoils, Fluid flow, Partial differential equations, Hydrodynamics, Harmonic analysis, Mathematical analysis.

The phenomenon of cavity resonance is explained as an interaction between the flow of the surrounding liquid and the compression and expansion of the contained gas. The general solution to the linearized problem of a symmetrical forebody performing symmetrical, harmonic motion, in an infinite medium, with a cavity pressure which is varying hermonically, is presented. The phenomenon of cavity resonance behind a stationary slender wedge in an infinite medium is studied in detail; the results show that self-excited pulsations at discreet frequencies are possible. (Author)

AD-294 819 Div. 9
(TISTA/GEC) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
CHEMICAL NON-EQUILIBRIUM EFFECTS IN HYPERSONIC PURE AIR WAKES,
by M. Lenard, M. E. Long, and K. S. Wan. Dec 62, 35p. incl. illus. 6 refs. (Rept. no. R62SD989)
(Contract AF 04(647)617)
Unclassified report

Paper presented at American Rocket Society 17th Annual Meeting and Space Flight Exposition, 13-18 Nov 62, Los Angeles, Calif.

DESCRIPTORS: *Hypersonic flow, Chemical reactions, Reaction kinetics, High temperature research, Theory, Air, Oxygen, Nitrogen, Nitro radicals, Electrons, Nitrogen compounds, Oxides, Atoms, Gases, Wake.

The effect of finite chemical reaction rates on the chemical structure of hypersonic wakes is examined. The technique of incipient non-equilibrium coefficients, based on linearized chemical kinetics for a 7-component (O2, N2, O, N, NO, NO+, e-) 10-reaction model of high temperature air, is utilized in the analysis. The far wake is treated as an asymptotic region; the near wake theory considers the viscous mixing of the boundary layer flow with the inviscid and recirculating flows in the base region, and the subsequent development of this viscous core into the wake region downstream. A range of altitudes and flight speeds of practical interest is considered. The results show where non-equilibrium effects are important in the wake and whether they arise primarily from convective or diffusive effects. The species that are the principal contributors to the non-equilibrium effects are also identified. The incipient non-equilibrium results are then related to calculations assuming chemically frozen flow. By the application of chemical kinetics to the frozen results, it can be shown that the appearance of incipient non-equilibrium effect bears an inverse relationship to the validity of the frozen flow assumption for equivalent wake calculations. (Author)

AD-294 830 Div. 9
(TISTP/JW) OTS price $2.60

California Inst. of Tech., Pasadena.
THE PULSATION METHOD FOR GENERATING CAVITATION DAMAGE,
by Milton S. Plesset. Dec 62, 1v. incl. illus. refs. (Rept. no. 85-22)
(Contract Nonr-22028)
Unclassified report

DESCRIPTORS: *Cavitation, *Pulse generators, Deformation, Deterioration, Damage control, Materials, Salts, Liquids, Corrosion.

Results are presented for the cavitation damage of materials by a laboratory procedure in which the cavitation is applied in an intermittent, or pulsed, manner. It is found that the rate of damage in materials sensitive to corrosion is much greater for pulsed cavitation than for steady cavitation when the cavitating liquid is salt water. The damage rate is also increased by the pulsed cavitation for these materials when the cavitating liquid is distilled water but by a smaller amount than in the salt solution. For corrosion insensitive materials there is no significant difference between the cavitation damage rate when it is applied in a steady or in a pulsed manner. (Author)

AD-294 831 Div. 9, 25
(TISTP/JW) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
LEAKY WAVES IN ELECTROMAGNETIC PHENOMENA,
by Arthur A. Oliner. 2 Aug 62, 37p. incl. illus. 25 refs. (Rept. no. PIBMRI-1064-62)
(Contract AF 19(604)7499, Proj. 4600)
(AFCRL 62-908) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Plasma physics, Radiation effects, Surfaces, Antennas, Excitation.

The class of waves known as leaky waves plays an important role in a variety of electromagnetic phenomena in open regions, and a recognition of this role permits new insight into many of these phenomena. The properties of leaky waves are discussed, and their usefulness is illustrated in connection with so-called leaky wave antennas, radiation from source-excited plasma layers, radiation from periodically-modulated surfaces, log-periodic antennas, Wood's anomalies on periodic structures, and Cerenkov and Smith-Purcell radiation. (Author)

10. FUELS AND COMBUSTION

AD-293 914 Div. 10, 30
(TISTM/EJH) OTS price $6.60

Princeton U., N. J.
EXPERIMENTS ON THE IGNITION OF COMPOSITE SOLID PROPELLANTS.
Master's thesis,
by Philip L. Cowan. Jan 60, 1v. incl. illus. tables; 24 refs.
(Contract AF 49(638)411)
(AFOSR-650) Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Ignition, *Shock tubes, Test equipment, Instrumentation, Calibration, Gages, Thin films, Photoelectric cells, High speed cameras, Motion picture cameras, Test methods.

An experimental study of composite solid propellant ignition was undertaken. A shock tube was used to generate high temperature gas to supply the ignition energy to the propellant samples under test. Two propellant configurations are described; a flush mounted sample in the end wall and a string mounted sample on the axis of the tube. The propellant mounting procedure is described and the problems encountered are discussed in detail. Three types of propellant were tested and the results are presented. Ignition times are measured by means of two phototubes viewing the propellant through quartz windows in the shock tube. The problems associated with the detection of ignition by this method are discussed. A high speed framing camera for observation of ignition is described and the photographic results are presented. Film processing techniques are outlined. The purpose of this report is to present only the experimental technique for the study of ignition in a shock tube and some typical results. (Author)

AD-294 326 Div. 10
(TISTM/SJR) OTS price $3.60

Southwest Research Inst., San Antonio, Tex.
STUDIES OF INTERNAL DIPLACEMENTS IN SOLID PROPELLANT GRAINS (SURFACE STRAINS IN CASE-BONDED, MODELS OF ROCKET MOTORS).
Interim rept.,
by Douglas Bynum, Jr. and Leonard U. Rastrelli.
10 Oct 62, 30p. incl. illus. table, 8 refs.
(Contract Nonr-336300, Proj. 1043-3)
Unclassified report

DESCRIPTORS: *Rocket cases, *Propellant grains, *Stresses, Strain gages, Mechanical properties, Tensile properties, Bonding, Elastomers, Esters, Isocyanic acids, Polymers, Urethanes, Test methods, Test equipment, X-rays, Scintillation counters, Measurement, Fracture (Mechanics), Processing, Rocket cases.

Strain measurements on the case of rocket engine models with applied loads were made with electric resistance type strain gages, enabling the computation of case surface stresses. The model consisted of an aluminum case and a viscoelastic grain. A model having a circular-shaped grain was tested first with an applied internal pressure and then was tested to failure with an applied axial load, uniformly distributed. A model having a star-shaped grain was loaded with an applied internal pressure until a failure by rupturing occurred. (Author)

AD-294 327 Div. 10
(TISTM/SJR) OTS price $5.60

Southwest Research Inst., San Antonio, Tex.
STUDIES IN INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAINS (DISPLACEMENTS IN CYLINDRICAL, UNFILLED-URETHANE SPECIMENS UNDER UNIAXIAL COMPRESSION).
Interim rept.,
by L. U. Rastrelli and R. C. DeHart. 1 Oct 61
50p. incl. illus. tables.
(Contract Nonr-336300, Proj. 1043-3)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Propellant grains, *Deformation, *Distortion, X-rays, *Scintillation counters, Fracture (Mechanics), Binders, Stresses, Theory.

Surface and internal longitudinal and radial displacement data, as acquired by using the embedded-particle technique, are presented for cylindrical models subjected to uniaxial compression loadings. Minor deviations from the predicted longitudinal and radial displacement linearity for axially symmetric conditions are noted. The material moduli and the model's volumetric behavior based on actual displacement measurements are also presented. (Author)

AD-294 475 Div. 10, 4
(TISTM/RGR) OTS price $.75

Monsanto Research Corp., Dayton, Ohio.
SURVEY OF RECENT RESEARCH IN FLAME EXTINGUISHMENT.
Rept. for May 61-Sep 62 on A Research Program for Understanding the Mechanisms of Flame Inhibition,
by G. B. Skinner. Dec 62, 21p. 87 refs.
(Contract AF 33(657)7617, Proj. 6075)
(Suppl. 1 to ASD TR 61-408, AD-272 122)
Unclassified report

DESCRIPTORS: *Fire extinguishers, *Fires, *Flames, Hydrocarbons, Halocarbons, Foams, Powders, Sprays, Fire detectors, Firefighting vehicles, Literature, Bibliography, Inhibition.

Current state-of-the-art in flame extinguishment by chemical and physical agents is reviewed, based on papers published during the period April 1961 - Aug 1962, in technical journals, trade literature and Government reports. Papers presented in two symposia are also considered: an American Chemical Society Symposium on Fire Control Research, held at the September 1961 meeting of the Society, and the Ninth Symposium on Combustion, August, 1962. (Author)

AD-294 476 Div. 10
(TISTM/SJR) OTS price $1.00

Monsanto Research Corp., Dayton, Ohio.
MECHANISM AND CHEMICAL INHIBITION OF THE HYDRAZINE-NITROGEN TETROXIDE REACTION.
Rept. for Aug 61-Oct 62 on A Research Program for Understanding the Mechanisms of Flame Inhibition,
by G. B. Skinner, W. H. Hedley and A. D. Snyder.
Dec 62, 29p. incl. illus. 20 refs.
(Contracts AF 33(616)7757 and AF 33(657)7617, Proj. 6075)
(ASD TDR 62-1041) Unclassified report

DESCRIPTORS: *Rocket fuels, *Combustion, *Fuel additives, Hydrazines, Nitrogen compounds, Tetroxides, Borates, Methyl radicals, Bromides, Ethanes, Benzene, Thiophenes, Toluenes, Combustion chamber gases, Reaction kinetics.

The mechanism of the hydrazine-nitrogen tetroxide reaction was investigated by examination of the variation in reaction products and equilibrium reaction temperature with increasing reactant concentration when argon-diluted reactant streams were rapidly mixed in a flow reactor. It is concluded that the reaction proceeds through a thermal reaction mechanism rather than a chain-branched explosion mechanism. An ignition test was devised to determine the effect of candidate reaction inhibitors. Thiophene, toluene, trimethyl borate, ethyl bromide and benzene produced some inhibition, but only at high concentrations. These results support the conclusions that a thermal mechanism is operative. (Author)

AD-294 501 Div. 10
(TISTM/SJR) OTS price $31.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE CHEMISTRY OF REACTION FUELS (Khimiya Reaktivnykh Topliv),
by Ya. M. Paushkin. 8 Nov 62, 723p. incl. illus. tables, refs. (Trans. no. FTD-TT-62-1417 from Izdatel'stvo Akademii Nauk SSSR, Moskva, 437p. 1962)
Unclassified report

DESCRIPTORS: *Liquid rocket propellants, *Solid rocket propellants, Hydrocarbons, Fuels, Jet engine fuels, Thermodynamics, Thrust, Nitric acid, Nitrogen compounds, Oxides, Hydrogen compounds, Peroxides, Oxygen, Ozone, Fluorine, Nitro radicals, Methanes, Ethylene oxide, Binders, Hydrazine derivatives, Perchloric acid, Fluorochlorides, Bromine compounds, USSR.

In this translation of a Russian test dealing mainly with liquid and, secondarily, with solid rocket propellants, the following topics are covered: (1) relationship of chemical composition of fuels to their combustion characteristics; (2) various types of jet engines and fuels; (3) composition and physicochemical properties of crude petroleum and of hydrocarbon fuels; (4) fuels based on beryllium, boron nitric acid, oxides of nitrogen, hydrogen peroxide, liquid oxygen, ozone and fluorine compounds; and (5) oxidizers-tetranitromethane, oxygen compounds of chlorine and fluorine, tetrafluorohydrazine, chlorine trifluoride, bromine pentafluoride, perchloric acid.

AD-294 503 Div. 10, 4
(TISTM/ODN) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FUEL CHEMISTRY (SELECTED ARTICLES).
20 Dec 62, 29p. incl. illus. tables, refs. (Trans. no. FTD-TT-62-1185 from Russian Periodical Neftekhimiya 1:5, pp. 613-623, 669-674, 1961)
Unclassified report

DESCRIPTORS: *Fuels, *Hydrocarbons, Cyclohexanes, Ethylenes, Pressure, Naphthalenes, Oxidation, Chemical reactions, Methyl radicals, High pressure research, Chromatographic analysis, Benzenes, Ethyl radicals, Propenes, Reaction kinetics, Propyl radicals, USSR.

Contents:
Thermal alkylation of methylcyclohexane with olefins under pressure
Alkylating tetrahydronaphthalene by olefins in the aliphatic ring
Oxidation of hydrocarbons with a high degree of conversion

AD-294 601 Div. 10, 25
(TISTP/JW) OTS price $4.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
FLAME INHIBITION RESEARCH.
Quarterly progress rept. and Yearly summary, 1 Nov 61-31 Oct 62.
Nov 62, 44p. incl. illus. tables, refs. (Rept. no. TG 376-8)
(Contract NO 62-0604-c)
Unclassified report

DESCRIPTORS: *Flame propagation, *Flames, Fuel additives, Ignition, Kinetic theory, Computers, Fire control, Velocity, Nozzles, Inhibition, Diffusion.

The all glass-ceramic flat flame burner has been operating successfully and several characteristic profiles were obtained showing effect of HBr and CH_3Br on a methane-oxygen flame. The analysis of these profiles is under way. A machine program for calculating nozzle reactions was modified for making calculations of the effect of inhibition reactions on the chemistry of flames. A simple theory was proposed to connect these calculations with flame theory to allow prediction of the effect of an inhibitor on the burning velocity. The Time of Flight Mass Spectrometer was reactivated and is being modified. Kinetic constants were derived from previous experimental data for the reaction of methane with hydroxyl radical. A survey was made of fire fighting techniques in the high energy fuel field and it was decided not to engage in field tests. (Author)

AD-294 809 Div. 10, 4, 25
(TISTM/ODN) OTS price $3.60

General Applied Science Labs., Inc., Hempstead, N. Y.
EXPERIMENTAL RESULTS ON SUPERSONIC COMBUSTION,
by J. Tamagno and O. Lindemann. Dec 62, 35p. incl. illus. 8 refs. (Technical rept. no. 332)
(Contract AF 49(638)991)
Unclassified report

DESCRIPTORS: *Hydrogen, *Combustion, *Air, *Shock tubes, Supersonic nozzles, High pressure research, Shock waves, Electronic equipment, Gases, Ignition, Nitrogen, Diffusion, Theory, Supersonics, Supersonic flow.

Experiments on spontaneous combustion characteristics of hydrogen injected into a supersonic stream of hot air are described in detail. The results are presented and compared with a theory developed for premixed reactants. The experimental data show that if the initial static temperature and the static pressure of the air stream are high enough then diffusion will be rate controlling and a mixing theory using equilibrium chemistry could be used in analyzing the combustion process. If the chemical reactions are slow, the behavior of the combustion process can be studied as a system where mixing and diffusive effects are absent. The ignition delay times inferred from the initiation of the pressure rise along the burner are in good agreement with those predicted by the empirical correlation. The static temperature exerts a greater influence on the ignition delay time than the static pressure. The static pressure level is an important parameter in determining the time for complete combustion. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-294 409 Div. 11
(TISTE/CAM) OTS price $8.10

Army Transportation Board, Fort Eustis, Va.
VEHICLE EVALUATIONS IN SUBARCTIC ENVIRONMENT (ALASKA 1961-1962).
Final rept.
Dec 62, 77p. incl. illus. tables, 15 refs.
(Rept. no. TCB-61-073-EO)
Unclassified report

DESCRIPTORS: *Cargo vehicles, *Tracked vehicles, *Vehicle tracks, *Tires, *Tractors, Arctic regions, Terrain, Alaska, Armed forces maneuvers, Human engineering, Operations, Maintenance, Test methods, Logistics, Snow.

Vehicle evaluations in subarctic environment (Alaska 1961-1962), was a field evaluation of certain wheeled and tracked off-road vehicles. One phase was premaneuver and postmaneuver testing and one phase was an evaluation of equipment performance and transportation techniques in the maneuver area during the field exercise phase. Objectives of the evaluation were to: (a) provide additional logistical close in support vehicles, both wheeled and tracked, for a USARAL winter maneuver; (b) test wheeled and tracked vehicles, both military and commercial off-road types, in subarctic terrain; (c) evaluate transportation techniques under subarctic conditions not encountered during WILLOW FREEZE; and (d) conduct feasibility tests and evaluations of standard and experimental vehicles in a subarctic area. (Author)

12. GUIDED MISSILES

AD-293 816 Div. 12
(TISTA/FRL) OTS price $1.10

Martin-Marietta Corp., Denver, Colo.
BIBLIOGRAPHY ON ATTITUDE CONTROL OF SPACE VEHICLES,
by Clyde Briggs. Dec 62, 7p. refs.
Unclassified report

DESCRIPTORS: *Satellite attitude, *Bibliography, Control systems, Satellite vehicles.

AD-293 820 Div. 12, 20, 30
(TISTP/JW) OTS price $1.10

Martin-Marietta Corp., Denver, Colo.
NUCLEAR ROCKETS. A BIBLIOGRAPHY OF UNCLASSIFIED ARTICLES IN THE FIELD OF NUCLEAR PROPULSION, 1958 TO JANUARY 1961,
comp. by Clyde R. Briggs. Jan 61, 5p. refs.
(Literature search no. 11)
Unclassified report

DESCRIPTORS: *Nuclear propulsion, *Rockets, Bibliography.

AD-293 823 Div. 12, 30
(TISTA/FRL) OTS price $1.10

Martin-Marietta Corp., Denver, Colo.
OPERATIONS RESEARCH AS APPLIED TO THE NATIONAL SPACE PROGRAM.
Oct 62, 9p. refs. (Literature search no. 17)
Unclassified report

DESCRIPTORS: *Scientific research, *Bibliography, Space flight, Astronautics, Logistics, Probability, Management engineering, Effectiveness, Operations research.

AD-293 869 Div. 12
(TISTB/DGH) OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE POTENTIALITIES OF DECEPTION AS A SURVIVAL AID FOR A RETALIATORY MISSILE FORCE,
by Sorrel Wildhorn. Nov 62, 39p. incl. illus. tables (Research memo. no. RM-3355-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Launching sites, *Strategic bombing, Guided missiles, Probability, Theory, Simulation, Feasibility studies, Analysis, Survival, Abundance.

The analysis is conducted in generalized cost-effectiveness terms assuming that deception is successful; i.e., that the attacker is not aware that some targets are false or that he may suspect or know that some are false but is incapable of distinguishing the real from the false target. The selected payoff measure is the expected number of surviving missiles normalized with respect to the number that a fixed budget could buy and operate for a fixed period of time. Its sensitivity to the basic variables such as relative cost of deception, relative allocation between the real system and deception measure, and the uncertain nature of enemy attack (relative weight and effectiveness) is examined to uncover parameter ranges where deception might be useful. That a deception scheme might fail outright or that its success might be only temporal must also be considered. Two hedges against these contingencies are suggested: (1) if possible, design the deception scheme so as to retain the option to convert (preferably cheaply) to the real thing in the future, and (2) allocate the budget to a greater-than-optimal fraction of missiles so that, although payoffs are decreased if deception is successful, penalties are lessened if deception fails. (Author)

AD-293 879 Div. 12, 1, 9
(TISTW/JEA) OTS price $3.60

General Dynamics/Convair, San Diego, Calif.
DEVELOPMENT OF A HIGH-TEMPERATURE, NUCLEAR-RADIATION-RESISTANT PNEUMATIC POWER SYSTEM FOR FLIGHT VEHICLES.
Quarterly rept., 25 Sep-24 Dec 62,
24 Dec 62, 35p. incl. illus. tables, 1 ref.
(Rept. no. GDC-63-001)
(Contract AF 33(616)7582)
Unclassified report

DESCRIPTORS: *Pneumatic servomechanisms, *High pressure valves, *Pneumatic reservoirs, *Auxiliary power plants, Compressors, Compressed air, Pneumatic valves, Control valves, Spaceships, High temperature research, Electron beams, Welding, Radiant heating panels, Fracture (Mechanics), Radiation effects, Power supplies, Nuclear explosions, Aircraft, Aircraft equipment, Pneumatic systems, Pneumatic devices, Satellite vehicles.

The development of a high-temperature, nuclear-radiation-resistant pneumatic power system for flight vehicles is considered. Future flight vehicles will be subjected to extreme thermal environments because of heat generated by supersonic speeds and/or the propulsion systems. This results in new requirements for components and auxiliary systems. It is, therefore contemplated to design, develop and test a typical pneumatic system capable of operating under wide temperature excursions while in the presence of nuclear radiation. (Author)

AD-293 892 Div. 12
(TISTA/GEC) OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
AN EXPLICIT SOLUTION TO THE POWERED FLIGHT DYNAMICS OF A ROCKET VEHICLE,

by Duncan MacPherson. 31 Oct 62, 54p. incl. illus. ref. (Rept. no. TDR-169(3126)TN-2) (Contract AF 04(695)169) (SSD TDR 62-153) Unclassified report

DESCRIPTORS: *Guided missiles (Surface to surface), *Booster rockets, Mathematical analysis, Integral equations, Thrust, Guidance, Aerodynamics, Partial differential equations, Exhaust gases, Velocity, Dynamics, Control.

A general explicit solution to the powered flight dynamics of a rocket vehicle having constant thrust and constant effective exhaust velocity is presented. The use of this solution in guidance techniques is demonstrated. (Author)

AD-294 305 Div. 12, 15
(TISTP/JW) OTS price $3.60

Land-Air, Inc., Point Mugu, Calif.
CURVILINEAR COORDINATES ON AN ELLIPSOID OF REVOLUTION,
by P. Meehan. 22 Oct 62, 35p. incl. illus. (Rept. no. 39)
(Contract N-123(61756)19425A/PMR)
Unclassified report

DESCRIPTORS: *Guided missile trajection, *Orbital flight paths, Linear systems, Reliability, Ellipsoids, Data processing systems, Equations, Analysis.

Equations are developed for down-range, off-range, and height above sea level of a missile in flight. The earth is assumed to be an ellipse of revolution and down-range and off-range are assumed to be normal sections of the ellipsoid. The equations are designed to be valid for a missile going completely around the earth and to approach accuracy of first order survey. (Author)

AD-294 359 Div. 12, 15
(TISTM/SJR) OTS price $4.60

Air Force Office of Scientific Research, Washington, D. C.
MINIMUM FUEL TRANSITIONS,
by John Thomas. Nov 62, 45p. incl. illus. tables, 15 refs. (AFOSR/DRA 62-21)
Unclassified report

DESCRIPTORS: *Orbital flight paths, *Guided missile trajectories, Effectiveness, Rocket trajectories, Mathematical analysis, Theory, Rocket fuels, Fuel consumption.

The problem of finding the optimum method of transferring from one rocket orbit to another, where the criterion of optimality is that as little fuel as possible be expanded in the maneuver, is examined. Papers devoted to the aspects of this question were reviewed. In some cases, several minor calculations in the process of comparing and contrasting similar papers were carried out. Several numerical calculations are suggested and several questions are asked which, it is hoped, will be good starting points for future research on this problem, as well as related questions of a more general mathematical character. (Author)

AD-294 519 Div. 12, 18
(TISTW/PCR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ROCKETS AND STRATEGY,
by V. Larionov. 14 Nov 62, 9p. incl. illus. (Trans. no. FTD-TT-62-1580 from Krasnaya Zvezda, p. 4, 18 Mar 62)
Unclassified report

DESCRIPTORS: *Guided missiles (Strategic), *Satellite vehicles, *Space flight, Communication systems, USSR, Photographic intelligence.

A translation of a non-technical article which was published in the Soviet periodical Krasnaya Zvezda is presented. It describes in general terms the Soviet global rocket, which is indicated to have sufficient range to reach US targets when fired in any direction. A brief discussion of space satellites, including Samos, is also presented.

AD-294 534 Div. 12, 19
(TISTW/PCR) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MISSILE GUIDANCE (Upravleniye Raketami),
by Yu, Kh. Vermishev. 13 Nov 62, 88p. incl. illus. 8 refs. (Trans. no. FTD-TT-62-1335 from Voyennoye Izdatel'stvo Ministerstva Oborony SSSR, Moskva, 78p., 1961)
Unclassified report

DESCRIPTORS: *Guidance, *Stabilization systems, *Command systems, *Homing devices, Control systems, Errors, Gyro stabilizers, Gyroscopes, Inertial guidance, Guided missile trajectories, Guided missile tracking systems, Infrared target seekers, Radar homing, Radar target seekers, Heat homing, Guided missile computers, Fire control systems, Integrators, Range, Radio homing, Radar tracking, USSR, Guided missiles.

Contents:
General principles of missiles
Guidance system errors
Flight stabilization of a missile
Internal guidance systems for V-2 ballistic missiles
Inertial systems of internal guidance
Command methods of guidance
Homing methods and combined methods of guidance

AD-294 542 Div. 12, 27, 25, 14
(TISTA/FRL) OTS price $6.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
QUARTERLY RESEARCH REVIEW NO. 31, 1 AUGUST-30 NOVEMBER 1961.
31 Dec 61, 61p. incl. illus. tables, 43 refs. (Rept. no. RR-TR 62-4)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Phenolic resins, *Nuclear physics, *Radioactive decay, *Liquid rocket propellants, Masers, Polymers, Styrenes, Stresses, Deformation, Plastic flow, Photoelasticity, Tensile properties, Structures, Elasticity, Tantalum compounds, Carbides, Materials, Tungsten, Graphite, Plasma jets, Asbestos fiber, Ablation, Combustion, Plasma physics, Radiometers, High temperature research, Spectrographic data, Calcium.

AD-294 556 Div. 12, 15, 19, 30
(TISTW/PCR) OTS price $3.60

California U., Los Angeles.
ON THE APPROXIMATION OF TRAJECTORIES AND ITS

APPLICATIONS TO CONTROL SYSTEMS OPTIMIZATION PROBLEMS,
by Masanao Aoki. Nov 62, 35p. incl. illus. 6 refs. (Rept. no. 62-58)
(Contract Nonr-23352)
Unclassified report

DESCRIPTORS: *Guided missile trajectories, *Control systems, *Programming, Mathematical computer data, Computer logic, Least squares method, Functional analysis, Polynomials, Curve fittings, Matrix algebra, Integral equations, Functions, Numerical methods and procedures, Mathematical analysis, Dynamics.

The problem of obtaining best approximate realization of a given trajectory by the system trajectory has been considered. In general this problem cannot be solved exactly and various upper bounds on the error are derived in the paper. In the case called independent control case each component of state variables can be controlled independently. Therefore, the problem becomes one-dimensional, and certain cases are shown to be solved exactly by utilizing certain graphical techniques and min-max theorems. (Author)

AD-294 779 Div. 12, 28
(TISTW/PCR) OTS price $8.10

Air Force Ballistic Missile Div., Air Research and Development Command, Inglewood, Calif.
HUMAN ENGINEERING DESIGN STANDARDS FOR MISSILE SYSTEM EQUIPMENT.
1 Nov 58, 80p. incl. tables (AFBM Exhibit 57-8A; supersedes WTD Exhibit 57-8, 1 Aug 57, rev. 1 Mar 58)
Unclassified report

DESCRIPTORS: *Human engineering, *Guided missiles, Guided missile personnel, Design, Ground support equipment, Standardization, Reliability, Automation, Display systems, Coding, Selection, Safety devices, Markers, Cathode ray tubes, Control, Hazards, Control knobs, Control panels, Control systems, Switches, Physical properties, Conductors, Colors, Noise, Vibration, Humidity, Temperature, Illumination, Anthropometry, Tables.

This exhibit was prepared for design engineers. It sets forth design principles and practices, both general and specific, to be used in designing equipment for maximum utilization by guided missile operator and maintenance personnel. In addition, this exhibit is an attempt to provide a basis for design standardization within and among systems. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-293 980 Div. 13, 18
(TISTE/OHD) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
PRELIMINARY DEVELOPMENT AND TESTS OF A BLAST-CLOSURE VALVE,
by R. A. Breckenridge. Sep 62, 23p. incl. illus. table, 24 refs. (Technical note no. N-460)
(Proj. Y-F008-10-117)
Unclassified report

DESCRIPTORS: *Valves, *Blast, Pressure, Shock waves, Air raid shelters, Ventilation, Ventilation ducts, Aluminum, Steel, Gas flow, Tests.

The ventilation systems of shelters providing blast protection must have automatic valves to prevent ingress of damaging pressure waves through the air ducts. This report discusses a 600-cfm blast-actuated closure valve developed for overpressure up to 100 psi. A series of air-flow and blast tests were performed which show that the valve has the potential to satisfy all of the desirable criteria but requires further development. (Author)

AD-294 309 Div. 13
(TISTB/DGH) OTS price $1.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
A DEVELOPMENT PROGRAM FOR POLAR CAMP SANITATION,
by W. R. Nehlsen. 28 Dec 62, 7p. illus. tables. (Technical note no. 476)
(Proj. Y-F015-11-211)
Unclassified report

DESCRIPTORS: *Sanitary engineering, Antarctic regions, Sewage, Disposal, Latrines, Feasibility studies, Sea water, Arctic regions.

A study has been made of the problems and current developments in the field of polar sanitation. It is concluded that research and development work should continue or be undertaken in the following fields: improved application of water carriage sewage systems, including development of minimum water use appurtenances and criteria, and studies of heating and insulating sewers; and development of surface and sub-surface sea intake systems. (Author)

AD-294 570 Div. 13
(TISTE/CAM) OTS price $6.60

Army Armor Board, Fort Knox, Ky.
SERVICE TEST OF CRANE, 20-TON, ROUGH TERRAIN.
16 Jan 63, 63p. incl. illus. (Proj. 2177)
(DA Proj. 8M68-08-001-06)
Unclassified report

DESCRIPTORS: *Hoists, Terrain, Test methods, Mobile, Airborne, Cargo vehicles, Military requirements, Operation, Maintenance.

The 20-ton rough terrain crane consists of a 4x4 carrier on which is mounted a full-revolving-crane superstructure capable of crane, dragline, and clamshell operations. It incorporates several features which are different from the standard item it is intended to replace. Significant variations are: torque-proportioning differentials, large earthmoving tires, a tire inflation-deflation system, a utility blade designed to perform limited dozing, and hydraulically-operated outriggers. For operation over adverse terrain, four-wheel drive and rear wheel steer are available at the driver's option. (Author)

AD-294 806 Div. 13
(TISTP/JW) OTS price $5.60

Institute of Atmospheric Physics, U. of Arizona, Tucson.
SEPARATE COMPONENT MULTIPLE-EFFECT SOLAR DISTILLATION.

Interim rept. no. 1,
by Carl N. Hodges, T. Lewis Thompson, and John E. Groh. 1 Nov 62, 48p. incl. illus. tables, 22 refs.
Unclassified report

DESCRIPTORS: *Solar energy, *Water, Evaporation, Condensation, Heat exchangers, Salinity, Desalination, Processing.

Research concerning a desalting system which utilizes solar energy and separate components for evaporation and condensation was conducted during April 28 to October 28, 1962. While cost optimization was not completed, equations were developed for solar collector performance and specific productivity. Items of equipment, such as heat exchangers, packed towers, spray chambers, etc., also received careful investigation. A model plant was constructed and is presently being operated. (Author)

14. MATERIALS (NON-METALLIC)

AD-293 997 Div. 14, 4
(TISTM/ODN) OTS price $1.10

Smith, A. O. Corp., Milwaukee, Wis.
GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS.
Monthly progress rept. no. 10, 1-31 Dec 62 on Effect of Glass Surface Chemistry on Wetting, Bond Strength and Bond Life of an Epoxy Resin. 15 Jan 63, 5p. 1 ref.
(Contract NOw 62-0679-c)
Unclassified report

DESCRIPTORS: *Plastics, *Laminates, *Glass textiles, *Reinforcing materials; Fibers, Surfaces, Glass, Resins, Epoxy resins, Cleaning, Bonding, Failure (Mechanics), Surface properties.

A refined butt-joint chain method was capable of measuring an average bond strength of about 1000 psi, with a standard deviation of only about 300 psi for 12 specimens of a chemically cleaned glass-Epon 828 (CL) system. The reproducibility was much improved in comparison to previous specimen designs. Evaluation of the present specimen design on an A-1100 treated chemically cleaned glass surface will be continued. Further work will also be directed toward refining the improved method of measuring bond strength. A review of specimen designs and problems leading to the present design is presented in this report. (Author)

AD-294 155 Div. 14, 8
(TISTM/EJH) OTS price $5.60

Bendix Corp., Eatontown, N. J.
CERAMIC TO METAL SEALS FOR HIGH-TEMPERATURE THERMIONIC CONVERTERS.
Quarterly technical rept. no. 1, 1 Oct-31 Dec 62, by M. L. Dring. 15 Jan 63, 1v. incl. illus. tables. (Rept. no. RBESO 3404-1)
(Contract AF 33(657)10038, Proj. 8173)
Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Seals, *Refractory materials, *Ceramic materials, *Glass seals, Metal seals, Aluminum compounds, Oxides, Molybdenum, Glass Plane transitions, Electron beams, Welding, Ultrasonics, Metal coatings, Manganese, Rhodium, Plating, Diffusion, Composite materials, Tungsten, Bonding, Diodes, High temperature research, Cesium, Cathodes (Electron tubes).

The first quarter of a one-year program to develop improved ceramic to metal seals for use in thermionic converters is reported. The objective of this program is to develop seals which are capable of long life at 1500 C in cesium and vacuum environments, and to extend the sealing techniques developed to materials which are capable of long life at temperatures in excess of 1500 C. The project was divided as follows: development of seals between high purity alumina and molybdenum; development of ceramic-metal composite materials from which converter envelopes can be fabricated with controlled gradiation of composition throughout the envelope body; study of refractory materials, analysis of materials systems occurring in seal areas, and optimization of particular characteristics of material systems utilized; and study of material systems. (Author)

AD-294 196 Div. 14, 4
(TISTM/SJR) OTS price $1.60

Midwest Research Inst., Kansas City, Mo.
SYNTHESIS OF ELASTOMERS CONTAINING Si-N BONDS IN THE MAIN CHAIN.
Quarterly progress rept. no. 5, 1 Oct-31 Dec 62, by L. W. Breed and R. L. Elliott. 31 Dec 62, 12p. incl. illus. table.
(Contract DA 23-072-ORD-1687, Proj. 593-32-002)
Unclassified report

DESCRIPTORS: *Elastomers, *Heat resistant polymers, Silicon compounds, Nitrogen compounds, Heterocyclic compounds, Stability, Thermal stresses, Hydrolysis, Catalysts, Ammonium radicals, Nitrates, Sulfates, Sodium compounds, Amides, Sulfonic acids, Toluenes, Synthesis.

Polymers containing silicon and nitrogen in the main chain with intrinsic viscosities (in toluene) up to 1.6 have been prepared by the condensation of hexamethylcyclotrisilazane with bisphenol A. When 4,4'-dihydroxyphenyl is used as the diol, polymers with improved thermal stability are obtained. The screening of various other monomer compositions is described. The great stability of small ring silicon-nitrogen compounds under the influence of acidic and basic catalysts is demonstrated in a variety of experiments; however, some conversion of octamethylcyclotetrasilazane to hexamethylcyclotrisilazane was observed at 175 degrees in the presence of aluminum or ferric chloride. (Author)

AD-294 346 Div. 14, 17, 25
(TISTM/EJH) OTS price $4.00

Defense Metals Information Center, Columbus, Ohio.
THERMAL RADIATIVE PROPERTIES OF SELECTED MATERIALS,
by W. D. Wood, H. W. Deem and C. F. Lucks.
15 Nov 62, 275p. incl. illus. tables, refs.
(DMIC rept. no. 177, vol. 2)
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Thermal radiation, *Refractory coatings, *Ceramic coatings, *Enamel coatings, *Heat resistant paints, Boron, Borides, Car-

bides, Paints, Oxides, Silicides, Phosphate coatings, Metal coatings, Refractory materials, Metals, Alloys, Data.

Contents:
Boron
Boride coatings
Carbide coatings
Enamels and paints
Oxide coatings
Silicide coatings
Phosphate coatings
Metallic coatings
Miscellaneous coatings

AD-294 576 Div. 14
(TISTM/SJR) OTS price $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
THE EFFECT OF SALT IN CONCRETE ON COMPRESSIVE STRENGTH, WATER VAPOR TRANSMISSION, AND CORROSION OF REINFORCING STEEL,
by Donald F. Griffin and Robert L. Henry.
12 Nov 62, 61p. incl. illus. tables (Technical rept. no. R-217)
Unclassified report

DESCRIPTORS: *Concrete, *Corrosion research, *Reinforced concrete, *Reinforcing steel, *Sea water, *Sodium compounds, Water vapor, Mechanical properties, Corrosion, Chlorides.

A gain in strength, lower values of water vapor transmission (WVT), and no significant corrosion of mild steel are realized when a salinity of 25 grams of salt per kilogram of solution is established in the mixing water. Other results reveal that an electrical-resistance corrosion-rate detection probe appears to be a reliable device for measuring the degree of corrosiveness of any concrete environment to reinforcing steel; with or without salts, WVT varies directly with the water-cement ratio; thinner concrete specimens have somewhat higher WVT rates than thicker concrete specimens; with increasing salinities the effect of thickness upon WVT becomes more pronounced. (Author)

AD-294 635 Div. 14, 15, 25
(TISTM/PCR) OTS price $4.60

Columbia U., New York.
A GENERALIZATION OF THE CONSTITUTIVE EQUATIONS OF LINEAR VISCOELASTICITY,
by M. P. Bieniek. Nov 62, 37p. 17 refs. (Technical rept. no. 17; Rept. no. CU-17-62-ONR 266(78) CE)
(Contract Nonr-26678, Proj. Nonr 064-446)
Unclassified report

DESCRIPTORS: *Elasticity, *Viscosity, *Equations of state, Kinetic theory, Dynamics, Deformation, Relaxation time, Differential equations, Operators (Mathematics), Stresses, Configuration, Transformations (Mathematics), Velocity, Acceleration, Displacement reactions, Tensor analysis, Vector analysis.

A review of kinematical and dynamical variables of state for visco-elastic media is subjected to large deformations is presented. Certain constitutive equations are given in the forms being the simplest generalizations of the equations of linear visco-elasticity. Their application to two cases of relaxation is outlined. (Author)

AD-294 636 Div. 14, 17
(TISTM/ODN) OTS price $1.60

Horizons, Inc., Cleveland, Ohio.
STUDIES OF THE REINFORCEMENT OF METALS WITH ULTRA HIGH STRENGTH FIBERS (WHISKERS).
Interim rept. no. 1, 28 Aug 61-21 Jan 62,
by Bertram C. Raynes and Robert H. Kelsey.
29 Jan 62, 12p. incl. tables.
(Contract NOw 62-0235-c)
Unclassified report

DESCRIPTORS: *Ceramic fibers, *Reinforcing materials, *Metals, *Aluminum compounds, *Oxides, Chemical bonds, Halides, Alloys, Diffusion, Nickel alloys, Chromium alloys, Extrusion, Sintering, Tensile properties, Control, Wetting agents, Density, Salts, Chlorides, Heat resistant alloys.

A study of the reinforcement of high temperature metals (in particular Nichrome alloys) with ultra high strength fibers (whiskers) has continued. The emphasis has been placed upon the development of a bond between the metal matrix and the reinforcing alumina whiskers. The extrusion-sintering composite preparation technique has been adopted as a standard approach in this work. The phenomenon of reinforcement apparently requires extremely precise control of the processes of diffusion in order to produce a chemical bond between the ceramic fiber and the metal matrix. Halides of various metals either present in the original metal alloy or deliberately added are presently under study. Reinforcement of a Nichrome V alloy consisting of an increase of almost 50% in measured tensile strength on a cold-worked composite has been achieved. Cold-worked Nichrome, prepared by the extrusion-sintering process, usually exhibits a room temperature tensile strength of about 210,000 psi; the composite specimen, reinforced overall with only 2-1/2% by weight of alumina whiskers, showed room temperature tensile strength of just over 300,000 psi. (Author)

AD-294 637 Div. 14, 17
(TISTM/ODN) OTS price $1.60

Horizons, Inc., Cleveland, Ohio.
STUDIES OF THE REINFORCEMENT OF METALS WITH ULTRA HIGH STRENGTH FIBERS (WHISKERS).
Interim rept. no. 4, 1 June-31 July 62,
by Bertram C. Raynes, Robert H. Kelsey and Eugene Wainer. 28 Sep 62, 16p. incl. illus. tables.
(Contract NOw 62-0235-c)
Unclassified report

DESCRIPTORS: *Iron, *Ceramic fibers, *Reinforcing materials, *Aluminum compounds, *Oxides, *Stainless steel, Powder metals, Sintering, Hydrogen, Reduction, Alloys, Argon, Wetting agents, Tensile properties, Chromium alloys, Nickel alloys, High temperature research, Melting.

The reinforcement of pure hydrogen-reduced iron by alumina fibers is shown, both at room temperature and at 900 F. Stainless steel was found to wet alumina fibers in an argon atmosphere, and the possibility of direct reinforcement is indicated. Melting of prealloyed metal powders on high-purity dense sintered alumina disks showed the presence of excessive amounts of oxides, some of which attack the alumina. These were shown to be present in the metal powder. Means for removing undesirable oxides are being developed. (Author)

Division 14·- MATERIALS (NON-METALLIC)

AD-294 665 Div. 14, 17
(TISTM/ODN) OTS price $1.60

Horizons, Inc., Cleveland, Ohio.
STUDIES OF THE REINFORCEMENT OF METALS WITH ULTRA HIGH STRENGTH FIBERS (WHISKERS).
Interim rept. no. 3, 1 Apr-31 May 62,
by Bertram C. Raynes, Robert H. Kelsey, and Eugene Wainer. 24 July 62, 14p. incl. tables.
(Contract NOw 62-0235-c)
Unclassified report

DESCRIPTORS: *Reinforcing materials, *Composite materials, *Ceramic fibers, *Nickel alloys, *Chromium alloys, Melting, Calcium compounds, Chlorides, Sintering, Tensile properties, Heat resistant alloys, Aluminum compounds, Oxides, Fibers.

Reinforced composites of Nichrome V and corundum fiber have shown tensile values from 250,000 to 300,000 psi, 25 to 50% increase over blank controls. A method for incorporating fiber in the metal matrix by melting, using CaCl2 as a flux, was devised. This technique has produced reinforcement and is more easily controlled than the sintering process heretofore used. The effect of water vapor in the hydrogen atmosphere used for sintering was profound: with a dew point of 50 F, the samples cracked in rolling and were useless. Evaluation of all sintering data indicated that, although reinforcement could be achieved, the process was difficult to control, and led to data having excessive variability. This variation was alleviated to some extent by the use of the fusion method. It is significant to note, however, that when reinforcement was achieved on an unequivocal basis, the degree of reinforcement matched theoretical expectations. (Author)

AD-294 688 Div. 14
(TISTM/ODN) OTS price $1.60

Union Carbide Corp., Parma, Ohio.
THERMOELECTRIC MATERIALS.
Final rept., 28 Jan 59-28 July 60,
comp. by R. G. Breckenridge. 15 Aug 60, 17p. incl. illus. tables.
(Contract NObs-77066, Proj. NS 058-001)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Crystals, Nitrides, *Rare earth compounds, *Semiconductors, Generators, Carbon, Graphite, Thermal conductivity, Theory, Halides, Alkali metal compounds, Chemical impurities, Boron, Density, Physical properties, Resistance, Temperature, Electrical conductance, High temperature research, Materials.

Contents:
Carbon and graphite materials
Refractory nitrides
Alkali metals in their fused halides
Crystal chemistry
Thermal conductivity
Theoretical studies
Development of prototype generators

AD-294 753 Div. 14, 31
(TISTM/ODN) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EFFECTS OF VARIOUS ENVIRONMENTS ON THE VIBRATION DAMPING EFFICIENCY OF MONSANTO TREATMENT MRC-OG4,
by B. V. Howell. 17 Jan 63, 6p. illus. (Rept. no. 94-43)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Submarine hulls, *Ships, *Damping, Plastics, Graphite, Vinyl radicals, Chlorides, Adhesives, Epoxy resins, Polymers, Steel, Aging, Tests, Vibration, Controlled atmospheres, Materials.

The damping characteristics of 0.57 inch thick slabs of modified MRC-OG4 plastic, bonded to 3/8 inch thick steel bars with an epoxy adhesive, were measured at 74 F over the frequency range of 0.3 kcps to 15 kcps, both before and after the following conditioning of three separate sets of bars: (a) immersion in JP-5 fuel for 2 weeks at 74 F, (b) immersion in water for 2 weeks at 74 F, (c) oven aging for 2 weeks at 158 F. The results obtained indicate that the treatment initially had damping greater than 3% of critical in the frequency range of 0.3 kcps to 9 kcps. The results further indicate that the damping efficiency of modified MRC-OG4 was not adversely affected by immersion in JP-5 fuel or water, or by accelerated aging. (Author)

AD-294 770 Div. 14
(TISTM/ODN) OTS price $1.75

Borden Co., Philadelphia, Pa.
STUDY LEADING TO THE DEVELOPMENT OF REINFORCED HIGH TEMPERATURE ELASTOMERS.
Annual summary rept., 27 June 61-30 Sep 62,
by K. C. Tsou, R. N. Goldey and others.
30 Sep 62, 72p. incl. illus. tables, 33 refs.
(Contract DA 36-034-ORD-3523, Proj. 59332-008)
Unclassified report

DESCRIPTORS: *Elastomers, *Silicones, Phenyl radicals, Physical properties, Polymerization, Methyl radicals, Polymers, Oxides, Rubber, Silicon compounds, High temperature research, Reinforcing materials, Vinyl radicals, Alkoxy radicals, Silanes, Diphenyl, Titanium compounds, Surface area, Tensile properties, Elasticity.

The reinforcement of a methyl phenyl silicone elastomer was investigated with various chemically modified silica fillers. An improvement from the triphenylsilyl modified filler can be attributed to the bulky steric factor of the triphenylsilyl group in reducing the depolymerization of the silicone. Molecular weight and change in other physical properties were determined during this investigation. Based on the data available, a mechanism of interaction of the silicone base and the filler at high temperature has been proposed. Ozonization of the vinyl-modified silica filler was made and no significant improvements were noted in the silicone rubber. The effects of various chemically modified fillers on the performance of the silica rubber at high temperature were compared. The evaluation of poly-2,6-dimethyl-1,4-phenylene oxide as a thermally stable polymeric diluent in the silicone elastomer was made. (Author)

AD-294 772 Div. 14
(TISTM/SJR) OTS price $3.00

Rocketdyne, Canoga Park, Calif.
PROGRAM OF TESTING NONMETALLIC MATERIALS AT CRYOGENIC TEMPERATURES.
Final rept., Feb 61-Sep [illegible],
by J. H. Lieb, S. Sherman and comp. by R. E. Mowers. 30 Dec 62, 154p. incl. illus. tables, 13 refs. (Rept. no. R-3498)
(Contract AF 04(611)6354, Proj. 6753)
(RTD TDR 63-11) Unclassified report

DESCRIPTORS: *Plastics, *Cryogenics, *Low temperature research, *Crystal structure, Polymers, Ethylenes, Fluorides, Nylon, Composite materials, Plastics, Asbestos fiber, Bronze, Glass textiles, Graphite, Crystallization, X-ray diffraction analysis, Hardness, Test equipment, Test methods, Reinforcing materials, Mechanical properties.

The tensile yield strength, ultimate tensile strength, tensile modulus, ultimate flexural strength, flexural modulus, ultimate compressive strength, compressive modulus, impact strength, modulus of rigidity, and coefficient of thermal expansion were determined for several plastic materials at 77, -110, -200, -320, and -423 F. Materials tested included TFE and FEP Teflon, Kel-F, Mylar, and nylon, as well as fabric- and powder-reinforced TFE and FEP Teflon. The program included the determination of the effect of thermal treatment of certain of the materials on the crystallinity level, and the resultant effect on the mechanical properties. (Author)

AD-294 801 Div. 14
(TISTM/ODN) OTS price $1.10

National Carbon Co., New York.
FABRICATION AND TESTING OF 103 IN. O.D. X 34 IN. I. D. X 70 IN. LONG GRADE CFW GRAPHITE.
Quarterly letter technical progress rept. no. 2, 1 Sep-30 Nov 62.
30 Nov 62, 3p.
(Contract AF 04(611)8383, Proj. 623A)
Unclassified report

DESCRIPTORS: *Graphite, *Cylindrical bodies, Carbon, Manufacturing methods, Production, Processing, Test facilities, Industrial equipment, Rocket motor nozzles, Handling, Molding, Impregnation.

A new lifting clamp was designed and manufactured for handling the 42,000 lb. 103 inch solid cylinders. A 100 ton capacity floor scale was installed and thoroughly tested. Several production cycles have been completed in the impregnating facilities. These cycles incorporated the impregnants which will be used for the CFW graphite cylinders. The results of this production were very satisfactory, yielding additional information and experience which will be utilized in impregnating the 103 inch cylinders. (Author)

AD-294 852 Div. 14, 16
(TISTM/ODN) OTS price $1.10

Oregon U. Dental School, Portland.
A STUDY OF FACTORS AFFECTING THE SETTING EXPANSION OF DENTAL GYPSUM MATERIALS.
Progress rept., 1 Feb 62-31 Jan 63,
by David B. Mahler. 1 Feb 63, 8p. incl. illus. table.
(Contract DA 49-193-md-2024)
Unclassified report

DESCRIPTORS: *Dental materials, *Gypsum, Waxes, Test methods, Casting, Heat, Calcium compounds, Sulfates, Thermal expansion, Dental materials.

The purpose of this project is to determine the factors which affect the setting expansion of dental gypsum materials. This progress report covers the work done in investigating the influence of wax thermal expansion and flow on the effective setting expansion of casting investments. Factors varied were nature of the wax, temperature of the setting environment and measurement direction on an MOD wax pattern. The results indicate that softer waxes and higher temperature setting environments result in greater effective setting expansion in the pupal plane of the wax pattern but little change in the gingival plane. The most uniform effective setting expansion results from the usage of a soft wax and a room temperature setting environment and a hard wax and a 100 F. setting environment. (Author)

AD-294 854 Div. 14
(TISTM/ODN) OTS price $1.60

Material Lab., New York Naval Shipyard, Brooklyn.
REINFORCED PLASTICS FOR DEEP SUBMERGENCE AND OTHER HIGH STRENGTH APPLICATIONS. EXTERNAL HYDROSTATIC PRESSURE RING TEST APPARATUS.
Progress rept. no. 4,
by N. Fried. 7 Jan 63, 10p. illus. (Lab. Proj. 6189-4)
Unclassified report

DESCRIPTORS: *Filament wound construction, *Composite materials, *Plastics, *Steel, Test equipment, Pressure vessels, Hydrostatic pressure, Tensile properties, Calibration, Design, Stresses, Thickness, Reinforcing materials, Mechanical properties, Rings.

An apparatus to enable the evaluation of the compressive and tensile properties of filament wound plastic composite specimens, in the form of rings or sections of cylinders, by external or internal hydrostatic radial pressure respectively, has been designed and constructed. Exploratory external pressure tests have been conducted on thick walled steel rings, for purposes of calibration, with good results. Some difficulty has been encountered with pressure seals at high hydrostatic pressures and steps are being taken to correct deficiencies. (Author)

AD-294 862 Div. 14
(TISTM/ODN) OTS price $1.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
BALLISTIC PROTECTIVE BUOYANT MATERIALS.
Quarterly rept. no. 11, 1 July-30 Sep 62,
by Michael C. Jaskowski. 28 Dec 62, 13p. incl. illus. table.
(Contract N140(138)72793B)
Unclassified report

DESCRIPTORS: *Buoyant materials, Acrylonitriles, Fibers, Dacron, Synthetic fibers, Life preservers, Nylon, Textiles, Ballistics.

Using hydrophobed 1.0 denier Acrilan staple fibers processed into needled battings, it was determined that ballistic effectiveness decreased with an increase in the amount of needling. From a limited investigation, it appears that the ballistic performance of a needled felt increases with an increase in areal density up to a certain value, above which additional weight per square yard does not result in any significant improvement. A needled batt, 50 oz/sq. yd., containing 6 denier Nylon tirecord fibers was found to be equal, approximately, in ballistic efficiency to a 16 oz/sq. yd. needled batt of 1 denier Acrilan. (Author)

15. MATHEMATICS

AD-293 876 Div. 15
(TISTP/TL) OTS price $7.60

California U., Los Angeles.
L - AND K - KERNELS ON AN ARBITRARY RIEMANN SURFACE,
by Myron Goldstein. 7 Dec 62, 71p. 15 refs. (Technical rept. no. 30)
(Grant no. DA-ARO(D)-31-124-G40, Proj. 1517-M)
(AROD 1517:44)
Unclassified report

DESCRIPTORS: *Differential equations, *Complex variables, Functions, Partial differential equations, Operators (Mathematics), Functional analysis, Potential theory, Green's function, Inequalities, Series, Conformal mapping, Topology.

Contents:
Differentials on a Riemann surface
Principal function
The capacity function
Harmonic differentials
Analytic differentials
Meromorphic functions

AD-293 887 Div. 15
(TISTP/TL) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ON A FINITE DIFFERENCE ANALOGUE OF AN ELLIPTIC BOUNDARY PROBLEM WHICH IS NEITHER DIAGONALLY DOMINANT NOR OF NON-NEGATIVE TYPE,
by J. H. Bramble and B. E. Hubbard. Dec 62, 20p. 19 refs. (Technical note no. BN-305)
(Grant nos. NSF GP-3 and AFOSR 62-454)
Unclassified report

DESCRIPTORS: *Differential equations, Matrix algebra, Integral equations, Operators (Mathematics), Green's function, Equations, Difference equations, Complex variables, Functions, Analog systems, Linear systems.

A study of a particular P(h4) finite difference analog of a two point boundary problem for the Sturm-Liouville equation is presented. This analog violates the usual properties of diagonal dominance and being of non-negative type at every interior mesh point. It is shown, however, that for the mesh size h taken sufficiently small a maximum principle is valid and that the discretization error is O(h4). It is further shown that the point Jacobi iteration method diverges while the forward-backward Gauss-Seidel method converges. (Author)

AD-293 899 Div. 15
(TISTP/GRW) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
STUDIES IN GENERALIZED RANDOM WALKS. I. DISTRIBUTION FUNCTIONS AND MOMENTS,
by A. William Kratzke. Nov 62, 30p. incl. illus. 4 refs. (Mathematical note no. 277; Document no. D1-82-0210)
Unclassified report

Also available from author.

DESCRIPTORS: *Numerical methods and procedures, *Statistical functions, Particles, Probability, Analysis, Test methods.

In the simple one-dimensional random walk a particle moves along a line in unit steps, either forward or backward. Consider the motion of the particle if the step lengths are not constant, but rather variables that depend on the position of the particle at each step. Such a generalization of the random walk is the subject of these studies. The motion of the particle is studied in some detail. If x is the position of the particle before a move, the particle has two alternatives; it may move to C1 + C2x or C3x where C1, C2, and C3 are constants subject to certain constraints. Several theorems are proved which specify just what points are accessible to the particle in a finite number of steps as well as for the limiting case of infinite steps. A fixed probability law which makes the walk random is assumed, i.e., the two alternatives described above are assigned probabilities p and q and p + q = 1. Then the distribution function for the particle position after a given number of steps is determined. Finally, there is derived a body of results on the moments. These latter results are found without knowledge of the distribution functions. (Author)

AD-294 118 Div. 15
(TISTP/TL) OTS price $1.10

RAND Corp., Santa Monica, Calif.
POISSON SUMMATION FORMULAS FOR GROUPS-1: FINITE GROUPS,
by Richard Bellman. Mar 62, 4p. (Memo. no. RM-3001-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Statistical analysis, *Groups (Mathematics), Functions, Transformations (Mathematics).

A summation formula for finite groups is established analogous in form and proof to the classical Poisson summation formula. (Author)

AD-294 125 Div. 15
(TISTP/TL) OTS price $1.60

Applied Mathematics and Statistics Lab., Stanford U., Calif.
SEQUENTIAL TESTS FOR THE MEAN OF A NORMAL DISTRIBUTION II (Large t),
by John Breakwell and Herman Chernoff. 27 Nov 62, 17p. 5 refs. (Technical rept. no. 83)
(Contract Nonr-22552, Proj. NR-342-022)
Unclassified report

DESCRIPTORS: *Statistical tests, *Statistical distribution, *Probability, Real variables, Transformations (Mathematics), Special functions, Taylor's series, Differential equations, Symposia, Sequential analysis, Sampling, Drift, Sequences.

Asymptotic expansions are derived for the behavior of the optimal sequential test of whether the unknown drift mu of a Wiener Levy process is positive or negative for the case where the process was observed for a long time. The test is optimal in the sense that it is the Bayes test for the problem where we have an a priori normal distribution of mu, the regret for coming to the wrong conclusion is proportional to mu, and the cost of observation is constant per unit time. The Bayes procedure is then compared with the best sequential likelihood ratio test. (Author)

AD-294 126 Div. 15, 26
(TISTP/GRW) OTS price $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ON A PSEUDO-SOLUTION TO A SCHEDULING PROBLEM,
by S. Zacks. 14 Dec 62, 15p. incl. table.
(Technical rept. no. 84)
(Contract Nonr-22552, Proj. NR-342-022)
Unclassified report

DESCRIPTORS: *Scheduling, *Operations research, Sequences, Series, Test methods, Sequential analysis.

The scheduling problem considered is relatively simple. All the operations were considered as equally important, and it was assumed that each of the operations could be performed at any time uninterruptedly. In reality, most of the scheduling problems are more complicated. Some operations often require priority over other operations in the sense that they are more profitable or a higher utility weight is attached to them. In these cases, the scheduling problem might be more complicated, since there are more restrictions in the case of priorities, and more freedom of choice in the case of discontinuous operations. Yet, no way of finding a general optimal solution, which is short of complete enumeration, was established. Pseudo-solutions, based on an extra assumption concerning the dependence structure among the earliest starting points of operations, were derived by the method of dynamic programming. (Author)

AD-294 307 Div. 15
(TISTP/WH) OTS price $1.60

Land-Air, Inc., Point Mugu, Calif.
ON A SPECIFIC SEQUENTIAL TEST FOR A BINOMIAL DISTRIBUTION,
by Eberhard H. Baur. 6 Nov 62, 12p. incl. illus. table (Rept. no. 40)
(Contract N-123(61756)19425A/PMR)
Unclassified report

DESCRIPTORS: *Sequential analysis, *Statistical distributions, *Polynomials, Probability, Mathematics.

The two hypotheses Ho ($p \leq p2$) and H1 ($p > p2$) for the basic probability p of a binomial distribution are tested. The parameters of the known likelihood sequential test are determined in such a way that for $p = p2 + \Delta p2$, H1 is accepted and for $p = p2 - \Delta p2$, Ho is accepted with the probability $P = 1 - \alpha$ each. In order to insure these demands in the graphical procedure, the distribution of the terminating trial number N is investigated. The results indicate that the procedure can be stopped after a finite trial number N1 with a complete satisfaction of the demands. (Author)

AD-294 311 Div. 15, 30
(TISTW/JEA) OTS price $3.60

Land-Air, Inc., Point Mugu, Calif.
COORDINATE TRANSFORMATION FORMULAS,
by Rita M. Brooks. 20 Nov 62, 29p. incl. illus.
(Technical note no. 3280-220)
(Contract N-123(61756)19425A)
Unclassified report

DESCRIPTORS: *Transformations (Mathematics), *Projective geometry, Programming, Mathematical logic, Ellipsoids, Computers, Linear programming, Numerical methods and procedures.

A presentation is presented of a step by step derivation of the coordinate transformations in use at Point Mugu. It is felt that this material will be beneficial to programmers and similar personnel dealing with geodetic transformations of this type. (Author)

AD-294 320 Div. 15, 6
(TISTW/JEA) OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE INCOHERENT SEQUENTIAL DETECTION OF A SINE WAVE IN WHITE NOISE,
by Ivan Selin. Dec 62, 14p. 11 refs. (Rept. no. P-2684)
Unclassified report

DESCRIPTORS: *Audiofrequency, *Signal-to-noise ratio, *Integral equations, Detection, Wave analysis, Distribution theory, Transformations (Mathematics), Integral transforms, Bessel functions, Series, Incoherent scattering.

Research is presented on the distribution of ending times of the sequential Bayes test for the presence in white noise of a sine wave known except for carrier phase. The algebraic computation is carried out for the case when signal is absent and the false alarm probability is very low. An integral equation has been obtained that is satisfied by the distribution of the ending time. (Author)

AD-294 354 Div. 15, 12
(TISTW/JEA) OTS price $10.50

Air Force Missile Development Center, Holloman Air Force Base, N. Mex.
ARMA LIGHTWEIGHT INERTIAL GUIDANCE SYSTEM SLED TEST PROGRAM SUMMARY REPORT. VOLUME II.
Sep 62, 131p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Inertial guidance, *Inertial navigation, *Vibration mechanisms, *Numerical analysis, Frequency modulation, Analysis, Errors, Acceleration, Servomechanisms, Simulation, Velocity, Numerical methods and procedures, Data processing systems, Measurement, Calculus of variations, Determinants, Differential equations, Vector analysis, Transformations (Mathematics), Statistical analysis, Integral equations, Control systems, Accelerometers.

This appendix is intended to serve a dual purpose. First it is meant to document the actually accomplished Arma sled test analysis scheme including the pertinent data processing aspects involved. Second, it appears desirable to have the explanations for and partial error analysis of the various steps taken all in one place and in a form which may be understood by those not dealing immediately with the effort. The primary reference system for the analysis of sled test data is the Space/Time system. The Space/Time system consists of: A set of very accurately surveyed markers (±.0005 foot rms leading edge placement as surveyed from the north end of the track); an accurate one-megacycle clock time base; a real time digitizer which digitizes and places on magnetic tape in binary form the time of the transducer passage by the fixed marker, ±1 microsecond; and the S/T head or transducer which senses the passage by the interrupters and transmits the pulse to the digitizer indicating

this event. Thus, from a sled run a set of times is obtained indicating sled (transducer) passage by the surveyed markers. This is the input information from which the reference quantity is formed. (Author)

AD-294 455 Div. 15
(TISTP/TL) OTS price $1.10

Boeing Scientific Research Labs., Seattle, Wash.
SMALL PROCEDURE FOR GENERATING NORMAL RANDOM VARIABLES,
by G. Marsaglia and T. A. Bray. Nov 62, 5p. 2 refs. (Mathematical note no. 283; Document no. D1-82-0221)
Unclassified report

Also available from the author.

DESCRIPTORS: *Real variables, *Probability, Statistical analysis, Programming, Numbers theory.

A normal random variable X may be generated in terms of uniform (0,1) random variables u1, u2,... in the following simple way: 86% of the time, put X = 2(u1+u2+u3-1.5), 11% of the time, put X = 1.5(u1+u2-1), and the remaining 3% of the time, use a more complicated procedure so that the resulting mixture is correct. This method takes only half again as long as the very fastest methods, is much simpler, and requires very little storage space. (Author)

AD-294 461 Div. 15
(TISTP/JW) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
SOLUTION OF LaGRANGE'S EQUATIONS BY ANALOG COMPUTATION,
by Arthur Hausner. 12 Nov 62, 14p. incl. illus. tables, 5 refs. (Rept. no. TR-1088)
Unclassified report

DESCRIPTORS: *Numerical analysis, *Matrix algebra, Acceleration, Stability, Feedback, Analog computers, Equations.

A procedure for solving LaGrange's equations of motion by analog computation is discussed. The problem of summing loop instabilities is minimized because the coefficient matrix of the acceleration terms in the generalized force equations is positive definite. No instability occurs if external generalized forces do not contain acceleration-dependent terms. A two-dimensional example is analyzed and it is concluded that the existence of such terms will rarely cause computer instability for realistic physical systems. (Author)

AD-294 709 Div. 15
(TISTP/WH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
GENERATION OF PERMUTATIONS BY ADJACENT TRANSPOSITION,
by Selmer M. Johnson. Jan 63, 9p. 2 refs. (Memo. no. RM-3177-1-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Numerical analysis, *Combinatorial analysis, Operations research, Computers, Production.

A new method is described for systematically generating all permutations of a set of objects, in which each permutation is formed exactly once. This is achieved by interchanging the marks in two adjacent positions in the preceding permutation. The procedure has certain advantages of simplicity over other methods and possibly is faster for machine computation. (Author)

AD-294 832 Div. 15
(TISTP/WH) OTS price $10.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
STUDIES IN SEARCH FOR A CONSCIOUS EVADER,
by R. C. Norris. 14 Sep 62, 134p. incl. illus. table, 9 refs. (Technical rept. no. 279)
(Contract AF 19(628)500)
(AFESD TDR 62-265) Unclassified report

DESCRIPTORS: *Operations research, *Games theory, *Detection, *Statistical processes.

This analysis considers a search problem in which the search is directed against a conscious evader or an object controlled by a conscious evader. It is a two-person, zero-sum game called a search evasion game. Although the searcher cannot observe any of the evader's actions, the evader can observe the searcher's and can capitalize on errors that he makes. At the beginning of the game, the evader hides in one of several boxes. The search process consists of a sequence of looks into the various boxes until the evader is found. Each look into a given box takes a fixed amount of time. If the searcher looks into the box in which the evader is located, he will find the evader with a certain probability--the detection probability associated with the box in question. A particular evasion device is assumed: the evader can move from one box to another between looks. A cost is usually associated with such a move. (Author)

AD-294 842 Div. 15, 9, 25
(TISTP/JW) OTS price $8.10

Paris U. (France).
INVARIANCE IN QUANTUM MECHANICS AND GROUP EXTENSIONS,
by Louis Michel. 15 Oct 62, 89p. incl. tables. (Technical note no. 9)
(Contract AF 61(052)474)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Groups (Mathematics), Spin, Operators (Mathematics), Particles, Mathematical analysis, Analysis.

16. MEDICAL SCIENCES

AD-293 855 Div. 16, 28
(TISTB/DGH) OTS price $12.50

Space Technology Labs., Inc., Los Angeles, Calif.
PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF SPACE FLIGHT: A BIBLIOGRAPHY VOLUME II. WEIGHTLESSNESS AND SUBGRAVITY,
by J. F. Price. Jan 63, 165p. (Research bibliography no. 44; Rept. no. 9990-6339-KU-000)
Unclassified report

DESCRIPTORS: *Weightlessness, *Bibliography, Space flight, Psychology, Physiology, Indexes.

This bibliography, consisting of 385 references (mostly annotated) on weightlessness and subgravity studies is the second in a series of volumes pertaining to the physiological and psychological effects of space flight. The majority of references are those published during the period January, 1952, to November, 1962. Author, agency, periodical, subject and ASTIA indices are included. (Author)

AD-293 870 Div. 16
(TISTB/MD) OTS price $4.60

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
THE EFFECTS OF SHOCK TUBE GENERATED, STEP-RISING OVERPRESSURES ON GUINEA PIGS LOCATED IN SHALLOW CHAMBERS ORIENTED SIDE-ON AND END-ON TO THE INCIDENT SHOCK.
Technical progress rept.,
by V. R. Clare, D. R. Richmond and others.
31 May 62, 53p. incl. illus. tables, 21 refs.
(Contract DA 49-146-XZ-055)
(DASA-1312) Unclassified report

DESCRIPTORS: *Air blast, *Shock waves, *Injuries, Laboratory animals, Survival, Shelters, Shock waves, Pressure, Pathology, Gas embolism, Hemorrhage, Ears, Lungs, Respiratory system.

A total of 308 guinea pigs were exposed to air blast in 4 close-fitting, shallow, rectangular chambers mounted on the top, bottom and sides of an air-driven shock tube. With a reflecting plate at the downstream edge of the chambers, the animals were exposed to long-duration shock overpressures that initially rose in a single step. The LD50-24-hr reflected pressure calculated from grouping all positions was 36.2 ± 0.8 psi. By moving the reflecting plate to various distances downstream of the chambers, shock overpressures that initially rose in two steps were applied. The results were that the animals' tolerances to overpressure rose as the time between pressure steps was increased. Comparison of the LD50's obtained with animals in each chamber revealed that there was not a significant statistical difference in their tolerances, whether they were loaded initially with the single-step pulse from their right, left, dorsal or ventral surfaces. (Author)

AD-293 872 Div. 16
(TISTB/MD) OTS price $2.60

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
THE TOLERANCE OF GUINEA PIGS TO AIR BLAST WHEN MOUNTED IN SHALLOW, DEEP, AND DEEP-WITH-OFFSET CHAMBERS ON A SHOCK TUBE.
Technical progress rept.,
by Donald R. Richmond, Victor R. Clare and Clayton S. White. 27 Oct 62, 37p. incl. illus. tables, 25 refs.
(Contract DA 49-146-XZ-055)
(DASA-1334) Unclassified report

DESCRIPTORS: *Air blast, *Shock waves, *Injuries, Laboratory animals, Survival, Shelters, Shock tubes, Pressure.

One hundred and eighteen guinea pigs were exposed to air blast in shallow, deep, and deep-with-offset chambers mounted on a shock tube. The LD(50)-24 hours, in terms of the incident shock pressures measured adjacent to the chambers, was calculated by probit analysis to be 34.9 psi, 19.5 psi, and 26.8 psi for animals in the shallow, deep, and deep-with-offset chambers, respectively. According to the LD(50) incident pressures, the shallow chambers offered the most protection against air blast; the deep chambers, the least. Comparing the LD(50)-pressure dose at the animals' location revealed little difference in their tolerance to overpressure, per se; i.e., LD(50) reflected pressures measured by gauges within the deep and deep-with-offset chambers were 34.6 psi and 35.9 psi, respectively. The LD(50) incident shock pressure of 34.9 psi in the shallow chambers was considered to be the dose at the animal's location in that instance. The protection against blast provided by the three chambers and the response of animals to the particular pressure-time patterns encountered are discussed. (Author)

AD-293 897 Div. 16
(TISTB/DGH) OTS price $2.60

Biological Labs., Frederick, Md.
BOTULISM,
by K. Matveyev and M. Gannushkin. Dec 62, 25p. incl. illus. 10 refs. (Trans. no. 687 from Bol'shaya Meditsinskaya Entsiklopediya, 4; pp. 266-287, 1962)
Unclassified report

DESCRIPTORS: *Botulism, *Clostridium Botulinum, *Botulism toxoid, Antitoxins, Resistance, Viability, Epidemiology, Pathology, Immunization, Diagnosis, Etiology, Therapy, Serum, Preventive medicine, USSR.

Contents:
Background
Etiology
Epidemiology
Pathogenesis
Pathological
Anatomy
Immunity
Clinical picture
Differential diagnosis
Complications
Treatment
Prophylaxis
Botulism in animals
Bibliography

AD-293 993 Div. 16
(TISTM/RGR) OTS price $.50

North Carolina U. School of Medicine, Chapel Hill.
THE VENTILATORY RESPONSE TO CARBON DIOXIDE AND TO OXYGEN AFTER ACCLIMATIZATION TO CARBON DIOXIDE.
Final rept., Feb 60-May 62 on Physiology Research,
by Thomas B. Barnett and Richard M. Peters.
Nov 62, 14p. incl. illus. 6 refs.
(Contract AF 33(616)6261, Proj. 7163)
(AMRL TDR 62-136) Unclassified report

DESCRIPTORS: *Respiration, Carbon dioxide, Oxygen, Controlled atmospheres, Blood chemistry.

A chamber has been designed so that dogs can be exposed for prolonged periods to abnormal atmospheres. The concentrations of CO2 and O2 are continuously controlled and recorded. Exposure of dogs to approximately 3% CO2 in air for 6 days or more resulted in a decrease in the ventilatory response to CO2. In control dogs the breathing of 50% O2 for 30 minutes was associated with a slight to moderate increase in ventilation without a significant change in arterial pCO2. After acclimatization to CO2 oxygen breathing was associated with little change in ventilation but with a rise in arterial pCO2. (Author)

AD-294 033 Div. 16
(TISTB/DGH) OTS price $1.10

Office of the Chief Surgeon, Hq. U. S. Army, Caribbean, Fort Amador, Canal Zone.
INVESTIGATIONS IN OVERSEAS UNITS.
Final rept., 1 Apr 61-30 June 62,
by Vernon J. Tipton. 30 June 62, 11p.
(Proj. 6X96-85-01)
Unclassified report

DESCRIPTORS: *Insects, *Panama, Fleas, Mites, Lice, Mammals.

A total of 37 species of fleas have been collected in Panama. Keys and illustrations have been prepared. The following mites have been collected in Panama: 76 species of chiggers of which 33 species are new, 5 new species of Hirstionyssus, 19 species of the subfamily Laelaptinae including 3 new species, 13 species of Spinturnicidae of which 8 species are new, and 45 species of ticks including 1 new species. Keys and illustrations have been provided. The Streblidae of Panama are represented by 44 species of which 30 are new to Panama and 19 are new to science. Four species of Nycteribiidae and 8 species of Hippoboscidae including one new record have been recorded from Panama. Two new species of Amblyopinus (Staphylinidae) found in association with small rodents have been described. (Author)

AD-294 035 Div. 16
(TISTB/LMH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE ROLE OF THE THYROID IN THE METABOLIC RESPONSE TO LOW TEMPERATURE,
by L. D. Carlson and A. C. L. Hsieh. May 57, 12p. incl. illus. 29 refs. (AAL technical rept. no. 57-1)
(In cooperation with Washington U. School of Medicine, Seattle, Wash., Contract AF 18(600)1467)
Unclassified report

DESCRIPTORS: *Medical research, *Biochemistry, *Thyroxine, *Thyroid gland, Metabolism, Body temperature, Diet, Respiration, Oxygen consumption, Heat production (Biology), Laboratory animals, Arctic regions, Exposure.

The requirement for thyroxin in chemical regulation of heat production was studied by testing the metabolic response of curarized rats to cold exposure at varying periods after thyroidectomy. Sprague-Dawley rats were kept at 5 and 28 C. The metabolic response to cold in curarized rats is not directly dependent upon the amount of circulating thyroxin because the response persists when thyroxin stores are depleted. Cold-adapted rats reduced their food intake and lost weight following thyroidectomy, but maintained a high metabolism at 5 C. (Author)

AD-294 036 Div. 16, 2
(TISTB/MS) OTS price $11.00

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
WINTER MICROCLIMATES OF IMPORTANCE TO ALASKAN. SMALL MAMMALS AND BIRDS,
by Harry McClure Johnson. Mar 57, 145p. incl. illus. table, 50 refs. (AAL technical rept. no. 57-2)
(In cooperation with Cornell U., Ithaca, N. Y.)
Unclassified report

DESCRIPTORS: *Alaska, *Animals, Mammals, Birds, Terrain, Distribution, Snow, Ecology, Climatic factors

Winter microclimatic conditions at areas in the continental interior of Alaska, and at areas on the Arctic Slope of Alaska were measured and observed during the 1950-1951 and 1951-1952 winter periods. Concurrent with the determinations of conditions of the physical environment, observations were made concerning animal activity and the biotic environment. The animals chiefly studied were the small mammals: Clethrionomys rutilus, Microtus oeconomus, Tamiasciurus hudsonicus, Mustela erminea, Sorex cinereus, and Lepus americanus; and the birds: Acanthis sp., Parus atricapillus, Corvus corax, and Pedioecetes phasianellus. An attempt was made to determine the response of these animals to conditions in the several zones during the principal microclimatic states and events. In general, the animals of all zones avoided the most severe conditions of the coldest zones. The subnivean small mammals were dependent for survival upon the continuous existence of the warm subnivean microclimates. The small birds at times fed on seeds on the cold snow surface when it had temperatures of -60 to -70 F. Relatively warm and cold microclimatic zones were also found at areas on the Arctic Slope and on the Arctic Coast. (Author)

AD-294 037 Div. 16
(TISTB/LMH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
BLOOD GROUPS OF THE ANAQTUAVIK ESKIMOS, ALASKA,
by W. S. Laughlin. June 57, 18p. incl. tables, 17 refs. (AAL technical rept. 57-5)
(In cooperation with Wisconsin U., Madison)
Unclassified report

DESCRIPTORS: *Blood, *Eskimos, *Anthropology, Genetics, Geography, Population, Classification, Alaska.

A blood group study of the Eskimos living in Anaktuvuk Pass was undertaken. Genealogical relationships and birthplaces were gathered, the gene frequency ratios were computed, and an analysis of the inheritance inside families was made. The frequencies were compared with those of other Eskimo tribes. The pesence of blood type B has been established in the interior Eskimos of Alaska. This is characteristic of the Alaskan Eskimo tribes for whom data now exist. All have varying frequencies of B as compared with the Alaskan Indians who either lack B or have an extremely small amount. (Author)

AD-294 093 Div. 16
(TISTB/LMH) OTS price $6.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE EFFECT OF LOW TEMPERATURES ON THE SURVIVAL OF AIRBORNE BACTERIA,
by T. W. Kethley, E. L. Fincher, and W. B. Cown. Mar 57, 62p. incl. illus. tables, 17 refs. (Technical rept. no. 83)

(Proj. 8-7958; In cooperation with Georgia Inst. of Tech. Engineering Experiment Station, Atlanta)
Unclassified report

DESCRIPTORS: *Bacterial aerosols, *Bacteria, Temperature, Humidity, Culture media, Staphylococcus, Serratia, Airborne, Escherichia, Viability, Arctic regions.

Results are reported for studies on various airborne bacteria under varying conditions of relative humidity at low temperatures. Employing airborne bacterial particles dispersed from beef broth cultures, studies are reported for Serratia marcescens, and Escherichia coli for the range of temperatures 80 to -40 F. Preliminary studies are reported for Serratia indica, Micrococcus pyogenes var. aureus and Micrococcus pyogenes var. albus. It is concluded that the experimental bacterial particles studied are very similar to those arising from natural causes and that the findings are generally applicable to many naturally occurring airborne bacteria. The very low death rate observed for the experimental bacterial aerosols at low temperatures is consistent with previous reports of the presence of viable bacteria in the upper atmospheres. It is suggested that the composition of the non-living material associated with the airborne bacterial particle is the most important single factor in determining the fate of such organisms. (Author)

AD-294 094 Div. 16
(TISTB/CCH) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
COMPARATIVE SWEAT RATES OF ESKIMOS AND CAUCASIANS UNDER CONTROLLED CONDITIONS,
by Kaare Rodahl and Donald W. Rennie. Mar 57, 20p. incl. illus. tables, 16 refs. (Technical rept. no. 84; Rept. no. 7)
(Proj. 8-7951)
Unclassified report

DESCRIPTORS: *Body temperature, *Perspiration, *Heat production (Biology), Eskimos, Anthropology, Arctic regions.

Comparative sweat rates and metabolic rates were measured in Eskimos and whites under three separate conditions. Thermometric studies were performed on two individuals from each group in order to permit correlations with body heat balance, body temperature, etc. The evidence indicated a greater heat production in the Eskimo group at rest and during standard comparative exercises. Under conditions favoring body heat debt, no difference in insensible water loss occurred between the two groups. The average skin temperature of the Eskimo did tend to be elevated above the whites' at all environmental temperatures below 35 C. This, undoubtedly, was due to the increased heat production of the Eskimo group and the resultant increased heat flux to the skin. A high correlation existed between the average skin temperature and sweat rates of both the Eskimo and white groups, and the frequency-distribution of the data was the same for both. This indicates that the thermosensory receptors in the skin of the Eskimo were stimulated relatively more under these conditions because of their warmer skin. The increased thermosensory activity from skin receptors would account for the increased sweat activity of this group. (Author)

AD-294 127 Div. 16, 15, 30
(TISTP/JW) OTS price $3.60

Texas U., Austin.
A MATHEMATICAL MODEL OF THE HUMAN THERMAL SYSTEM.
Rept. no. 5 (Final) on The Mathematical Analysis of Heat Transfer and Temperature Relations in the Human Body,
by Eugene H. Wissler. 15 Nov 62, 23p. illus. 11 refs.
(Contract DA 49-007-md-2005)
Unclassified report

DESCRIPTORS: *Anatomical model, *Physiology, Model tests, Data processing systems, Conductivity, Mathematical analysis, Heat production (Biology).

The latest in a series of mathematical models for the human thermal system are described. In preparing this model, finite-difference techniques to solve the heat conduction equation were used. Since numerial techniques were used, it was possible to include many more factors in this model than in the previous ones. The body was divided into fifteen geometric regions, which were the head, the thorax, the abdomen, and the proximal, medial, and distal segments of the arms and legs. Axial gradients in a given segment were neglected. In each segment, the large arteries and veins were approximated by an arterial pool and a venous pool which were distributed radially throughout the segment. Accumulation of heat in the blood of the large arteries and veins and heat transfer from the large arteries and veins to the surrounding tissue were taken into account. The venous streams were collected together at the heart before flowing into the capillaries of the lungs. Each of the segments was subdivided into fifteen radial sections, thereby allowing considerable freedom in the assignment of physical properties such as thermal conductivity and rate of blood flow to the capillaries. (Author)

AD-294 165 Div. 16
(TISTB/MS) OTS price $1.00

Biotechnology Lab., U. of Calif., Los Angeles.
ARM WATER LOSSES UNDER DISPARATE ARM AND BODY THERMAL CONDITIONS.
Final rept., Aug-Nov 61 on Biophysics of Flight,
by R. W. Allen and J. Lyman. Nov 62, 27p. incl. illus. tables, 11 refs.
(Contract AF 33(616)6763, Proj. 7222)
(AMRL TDR 62-131) Unclassified report

DESCRIPTORS: *Body temperature, *Perspiration, Temperature, Physiology, Emotions, Arms.

The relative contributions of local and peripheral control of sweating were investigated by subjecting the left arms of two subjects to a different environmental temperature than the rest of the body. The effect of the above conditions on the cooling power of the arm was also studied. Arm water loss was found to be a function of the temperature of the arm's environment, as well as a function of the temperature of the body's environment. Maximum arm heat loss tends to occur when arm environment temperature equals body environment temperature, though in the cases where unusually high sweat rates for high arm environmental air temperatures were exhibited the general relationship was not reliable. Also, evidence is offered in support of the need for further experimentation in order to determine the effects of subject acclimatization and emotional sweating on the present results. (Author)

AD-294 432 Div. 16
(TISTB/CCH) OTS price $2.60

Milan U. (Italy).
CHOLESTEROL AND FATTY ACID BIOSYNTHESIS IN BRAIN.
Annual technical rept., 1 Aug 61-31 July 62,
by S. Garattini. 31 July 62, 22p. incl. illus. tables.

(Contract DA 91-591-EUC-1836)
Unclassified report

DESCRIPTORS: *Brain, *Cholesterol, *Fatty acids, Serum, Liver, Laboratory animals, Aorta, Rats, Metabolism, Biosynthesis.

Propylthiouracil, given in the diet of mothers from the end of pregnancy, produces in litters a strong elevation of serum cholesterol and a moderate increase of liver and aorta cholesterol. The cholesterol synthesis in brain is very low when 2-C(14)-mevalonolactone is used as substrate but considerably increases when the potassium salt of 2-C(14)-mevalonic acid is incubated with the slices or the homogenates. Mevalonic-kinase is present in brain although in a concentration (per unit of weight) lower than that present in liver. In adult brain when cholesterol synthesis does not occur mevalonic kinase is still active. (Author)

AD-294 448 Div. 16
(TISTB/DGH) OTS price $1.60

American Foundation for Biological Research, Madison, Wis.
OBSERVATIONS ON THE EXTENT OF THE INJURY CAUSED BY THE FORMATION OF ICE IN THE FEET OF MICE,
by B. J. Luyet and R. J. Williams. June 62, 18p. incl. illus. 4 refs.
(Contract AF 41(657)343, Proj. 8240-19)
(AAL TDR 62-8) Unclassified report

DESCRIPTORS: *Exposure, *Injuries, Feet, Tissues (Biology), Mice, Arteriolonecrosis, Freezing, Ice.

This investigation was prompted by the reports of Smith and Lovelock that hamsters may recover fully after a considerable part of their water has been transformed into ice. The present study is limited in scope to the determination of the damage suffered by the feet of mice after freezing at -4, -6, -8 or -10 C and subsequent exposure at those temperatures for 10, 30 or 60 minutes. The results, as evaluated after a recovery period of 7 to 10 days, were: (1) exposure of a foot for 30 minutes or 1 hour, in the frozen state, at -10 and -8 C caused the destruction of the toes and often of a portion of the paw; (2) exposure for as much as one hour at -4 C or for 10 minutes at any of the temperatures mentioned did not prevent an apparently complete recovery; and (3) exposure for 30 to 60 minutes at -6 C resulted in a partial destruction of the toes. When the paw was destroyed (at -8 or -10 C, for one hour), the amount of ice present was found to have reached approximately 48 per cent of the weight. In cases of lesser injury, at higher temperatures and/or for shorter exposure times, sufficient information is not yet available to correlate the injury produced with the quantity of ice formed. (Author)

AD-294 480 Div. 16
(TISTB/MS) OTS price $3.00

New York U., N. Y.
MICROBIOLOGICAL WASTE TREATMENT PROCESSES IN A CLOSED ECOLOGY.
Final rept. for Jan 61-Mar 62 on Space Biology Research,
by William T. Ingram. Nov 62, 182p. incl. illus. tables, 110 refs.
(Contract AF 33(616)7837, Proj. 7164)
(AMRL TDR 62-126) Unclassified report

DESCRIPTORS: *Microorganisms, *Closed cycle ecological systems, *Metabolic products, Nutrition, Space flight, Processing, Disposal.

Wastes treated in a closed ecological system are discussed according to the parameters affecting composition, quantity, and microorganisms expected in the wastes. Conventional waste treatment processes, activated sludge, trickling filters, and anaerobic digestion are discussed. Microbiological considerations including lists of organisms peculiar to each system and combination of systems are presented and discussed. Results of aboratory scale experiments of conventional systems receiving concentrated waste are evaluated. Using by-products of waste treatment processes (sludge, bacterial bodies) as nutritional supplements for plants, algae, or animals in a nutrient support system for man during an extended space trip is considered. Experimental volume and power requirements are projected to those applicable under space capsule conditions. Limitations imposed on the several systems for extended space travel indicate that solids should be stored and liquids processed by other than microbiological treatment systems for space flights of less than 1 year. (Author)

AD-294 486 Div. 16
(TISTB/CCH) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
INTRODUCTORY REPORT ON REDUCTION AND ANALYSIS OF MEDICAL DATA COLLECTED DURING FIELD EXPERIMENTS,
by Marilyn Anderson, Paul Brock and others.
Oct 61, 21p. incl. illus. 7 refs. (Rept. no. 1)
(Contract DA 49-193-md-2169)
Unclassified report

DESCRIPTORS: *Battle injuries, *Casualties, *History, Statistical data, Combat.

The research objective is to summarize and analyze data collected in two medical field experiments of combat casualties, combat casualty field maneuvers, evacuation and data histories of casualties. This report describes the types of summaries and methods of analysis which will be used and the manner in which they will be reported. (Author)

AD-294 487 Div. 16
(TISTB/CCH) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
MEDICAL DATA SUMMARIES OF EVENTS OCCURRING IN THE SPRING 1960 USA-CDEC FIELD EXPERIMENT,
by Marilyn Anderson, Paul Brock, and George W. Evans, II. June 62, 56p. incl. illus. tables, 4 refs. (Rept. no. 5)
(Contract DA 49-193-md-2169)
Unclassified report

DESCRIPTORS: *Battle injuries, *Combat, *Casualties, Therapy, Statistical distributions, Ambulances, Data.

The research objective is to summarize and analyze data collected in two medical field experiments on combat casualty maneuvers, combat casualties evacuation, and field treatment. This report presents statistical summaries of the casualty data collected during the Spring 1960 field experiment. (Author)

AD-294 488 Div. 16, 18
(TISTB/MS) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
ANALYSIS OF THE MEDICAL DATA, FALL 1959 AND SPRING 1960 USA-CDEC FIELD EXPERIMENTS AND RECOMMENDATIONS,
by Paul Brock, George W. Evans II, and Palmer J.

Swanson. Aug 62, 31p. incl. tables (Rept. no. 6) (Contract DA 49-193-md-2169)
Unclassified report

DESCRIPTORS: *Army operations, *Military organizations, *Military medicine, *Casualties, Handling.

AD-294 500 Div. 16, 28
(TISTB/MS) OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL INVESTIGATION METHOD OF HIGHER HUMAN NERVOUS ACTIVITY,
by Vera Konstantinova Faddeyeva. 9 Nov 62, 343p. incl. illus. refs. (Trans. no. FTD-TT-62-358 from Metodika Eksperimentalnogo Issledovaniya Vysshey Nervnoy Deyatelnosti, Medgiz, Moskva, pp. 253, 1960)
Unclassified report

DESCRIPTORS: *Conditioned reflex, *Nervous system, Motor reactions, Brain, USSR, Test methods, Reflexes.

AD-294 513 Div. 16, 20
(TISTB/CCH) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIOBIOLOGY (SELECTED ARTICLES).
26 Dec 62, 43p. incl. illus. tables, refs. (Trans. no. FTD-TT-62-1316 from Russian Periodical, Radiobiologiya 1:4, pp. 535-542, 550-554, 583-590, 1961)
Unclassified report

DESCRIPTORS: *Radiobiology, *Radiation injuries, Brain, Hypothalamus, Electric potential, Metabolism, Immunology, Cerebral cortex, Pathology.

Contents:
Destruction of the recticular structure in the mesencephalon and hypothalamus and its effect on bioelectrical reactions of the cortex in acute radiation sickness
Acetylcholine metabolism in the thalamic region of the brains of dogs which have undergone acute radiation sickness
The value of immunological investigations in studying the pathogenesis of acute radiation sickness

AD-294 518 Div. 16
(TISTB/DGH) OTS price $2.60

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHYSIOLOGICAL JOURNAL (SELECTED ARTICLES).
7 Dec 62, 23p. incl. illus. tables, refs. (Trans. no. FTD-TT-62-1593 from Fiziologicheskiy Zhurnal SSSR 48:10, pp. 1203-1217, 1962)
Unclassified report

DESCRIPTORS: *High altitude, *Brain, *Anoxia, *Hypothermia, Respiratory system, Training, Dogs, Rats, USSR, Oxygen consumption, Pressure, Sensitivity, Effectiveness, Physiology, Tissues (Biology), Resistance.

Contents:
Effect of compensation of excessive intrapulmonary pressure on oxygen intensity in brain tissues during ascents to higher altitudes
On the mechanism of increasing the resistance of rats to deep hypoxic-hypercapnic hypothermia under the influence of preliminary training.

AD-294 523 Div. 16
(TISTB/MS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF PRESSOR AND DEPRESSOR SUBSTANCES ON SYSTEMIC AND PULMONARY CIRCULATION IN HYPOXEMIC HYPOXIA,
by K. N. Federova. 27 Dec 62, 10p. incl. illus. 10 refs. (Trans. no. FTD-TT-62-1581 from Russian Periodical, Byulleten' Experimentalnoy Biologii i Meditsiny 53:1, pp. 31-36, 1962)
Unclassified report

DESCRIPTORS: *Anoxia, *Acetylcholines, *Epinephrine, *Serotonin, *Body, *Blood circulation, Oxygen consumption, Respiration, Sensitivity.

The reactivity of the vegetative neural system in conditions of oxygen starvation arouses great interest. A number of researchers have explained that in hypoxemic hypoxia the body's sensitivity to adrenaline is substantially lowered. The weakening of the sympathetic nerves in conditions of hypoxia explains this. In experiments on animals and in observations of people it has been shown that hypoxia leads to a progressive increase in the body's sensitivity to acetylcholine, this increase being noticeable in both the intact vagus nerves and in their cross-section. The aim of this work was the study of the effect of pressor and depressor substances on systemic and pulmonary circulation in hypoxia in conditions of hypocapnia and of liquidation thereof. (Author)

AD-294 524 Div. 16
(TISTB/MS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CHANGES IN ELECTRIC ACTIVITY OF DIENCEPHALIC AREA AND CORTEX OF RABBIT'S CEREBRAL HEMISPHERES UNDER THE EFFECT OF BITEMPORAL DIATHERMY,
by L. A. Blagovidova, M. G. Belekhova and T. M. Zagorul'ko. 29 Nov 62, 10p. incl. illus. 15 refs. (Trans. no. FTD-TT-62-1482)
Unclassified report

DESCRIPTORS: *Diathermy, *Cerebral cortex, *Brain, Electrodes, Biophysics, Electrical properties.

The test with bitemporal diathermy was applied in clinic for many years to evaluate the functional state of diencephalic area. Attempts at analyzing the mechanism of this test by indirect indices (state of diuresis, supply of blood in diencephalic area) do not permit consideration of this problem as solved. No direct encephalographic examination of the test with bitemporal diathermy was conducted, regardless of the accomplishment of many works devoted to study of the effect of most diversified agents on the electric activity of diencephalon. (Author)

AD-294 530 Div. 16
(TISTB/DGH) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SCIENCE AND LIFE (SELECTED ARTICLES).
10 Dec 62, 44p. incl. illus. (Trans. no. FTD-TT-62-1518 from Nauka i Zhizn', no. 9, pp. 2-10, 15-19 and 54-60, 1962)
Unclassified report

DESCRIPTORS: *Space flight, *Space medicine, *Cosmic rays, *USSR, Microorganisms, Training, Tests methods, Analysis, Biology, Weightlessness, Aviation personnel.

Division 16 - MEDICAL SCIENCES

Contents:
Five days which electrified the world
Biology and flights into the cosmos
Through the cosmos, into the microcosm

AD-294 537 Div. 16
(TISTB/CCH) OTS price $16.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE FIRST MANNED SPACE FLIGHTS (Pervyye Kosmicheskiye Polety Cheloveka),
by Yu. M. Volynkin, V. I. Yazdovskiy and others.
7 Dec 62, 246p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1619 from Mediko-Biologicheskiye Issledovaniya, Moskva, 203p., 1962)
Unclassified report

DESCRIPTORS: *Space flight, *Space medicine, *USSR, Astronautics, Medical examination, Weightlessness, Radiation effects, Shielding, Recovery, Training, Physiology, Psychology, Monitors.

Contents:
Training cosmonauts in controlling the ship
Life support in space flight
  Microclimatic conditions in a spaceship cabin
  Food and water supply
Life support and recovery systems
  Radiation protection
  The biological effect of cosmic radiation in spaceships
  Measures providing radiation safety on the flights of Gagarin and Titov
  The protective properties of space suits
  Emergency supply pack of the cosmonaut
  Systems for landing the cosmonaut
Preparing cosmonauts for flight
  Familiarization-training flights on aircraft under weightlessness conditions
  Psychological investigations
Organization and method of carrying out physical training exercises
Results of the medical examination of the astronauts
Methods of physiological investigations and medical monitoring during spaceflight
The physiological reactions of the astronauts in flight

AD-294 571 Div. 16
(TISTB/LMH) OTS price $1.60

Aerospace Information Div., Washington, D. C.
RESULTS OF POSTFLIGHT MEDICAL EXAMINATIONS OF G. S. TITOV,
by N. M. Sisakyan and V. I. Yazdovskiy.
19 Dec 62, 12p. incl. illus. (AID rept. no. 62-204 from Pervyye Kosmicheskiye Polety Cheloveka (First space flights of man). Moskva, Izd-vo AN SSSR pp. 125-153, 1962)
Unclassified report

DESCRIPTORS: *Aviation personnel, *Medical examination, Physiology, Respiratory system, Urinary tract, Electrocardiography, Electroencephalography, Metabolic products, Space flight, USSR, Physical fitness.

AD-294 572 Div. 16
(TISTB/LMH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
PHYSIOLOGICAL RESPONSES OF COSMONAUTS DURING SPACE FLIGHT,
by N. M. Sisakyan and V. I. Yazdovskiy.
19 Dec 62, 5p. incl. table (AID rept. no. 62-202; Trans. from Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR, pp. 176-198, 1962)
Unclassified report

DESCRIPTORS: *Space medicine, *Space flight, Respiration, Acceleration, Weightlessness, Cardiotachometers, Physiology, Aviation personnel, USSR.

AD-294 573 Div. 16
(TISTB/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
METHODS AND TECHNIQUES OF BIOMEDICAL CONTROL IN SPACE FLIGHT,
by N. M. Sisakyan and V. I. Yazdovskiy.
19 Dec 62, 4p. (AID rept. no. 62-201; Trans. from Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR, pp. 167-174, 1962)
Unclassified report

DESCRIPTORS: *Control systems, *Physiology, *Electrocardiography, *Electrodes, *Space medicine, *Space flight, Test methods, Collecting methods, USSR, Data transmission systems, Medical equipment, Measurement.

Physiological measurements performed on Vostoks I and II included electrocardiography (with two sets of leads), pneumography, and registration of pulse rate. In addition, kinetocardiography was performed on Vostok II. The pulse rate was monitored continuously by means of a cardiophone which transformed the R peaks of electrocardiograms into rectilinear pulses of 0.1 to 0.2 sec duration. These were modulated by an auditory frequency of 3 kc and were transmitted continuously by a signal transmitter on a frequency of 19.95 mc. Other measurements were transmitted periodically. During reentry all physiological parameters were registered by means of a self-contained onboard system. After ejection of the cosmonaut, registration was carried on by means of a self-contained device located on his person. Transmitted data on pulse frequency was recorded on undulating and on magnetic tapes. (Author)

AD-294 574 Div. 16
(TISTB/MS) OTS price $1.10

Aerospace Information Div., Washington, D. C.
METHODS OF FIXING EKG ELECTRODES FOR SPACE FLIGHTS,
by M. A. Agadzhanyan, I. T. Akulinichev and others. 19 Dec 62, 4p. incl. illus. (AID rept. no. 62-200; Trans. from Method of Fixing Electrodes for EKG Recording during Manned Space Flights. IN: Problemy Kosmicheskoy Biologii: Tom 1 (Problems of Space Biology, v. 1) Moscow, pp. 451-459, 1962)
Unclassified report

DESCRIPTORS: *Electrodes, *Electrocardiography, *Space flight, USSR, Space medicine, Test methods, Physiology, Measurement, Medical equipment.

AD-294 586 Div. 16
(TISTB/DGH) OTS price $6.60

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON SERRATIA MARCESCENS,
19 Oct 54, 54p. refs.
Unclassified report

DESCRIPTORS: *Serratia, *Bibliography, Detection, Viability, Bacteriophages, Bacterial aerosols, Antibiotics.

AD-294 587 Div. 16
(TISTB/DGH) OTS price $6.60

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON LISTERIA, LISTERELLA, AND LISTERIOSIS.
1 Oct 57, 62p. refs.
Unclassified report

DESCRIPTORS: *Bacteria, *Bibliography, Antibiotics, Epidemiology.

Contents:
Detection and Identification
Culture Media
Morphology
Clinical Picture: Case Histories
Human Pathogenicity
Human Pathology
Variations
Serological and Antigenic Structure
Effect of Physical Agents
Effect of Chemical Agents
Chemotherapy
Immunology, Vaccines, Prophylaxes
Animal Sources and Animal Pathogenicity
Animal Pathology
Methodology
Tissue Culture
Freeze Drying
Staining
Epidemiology
General Epidemiology
Laboratory Infections
Epidemic Countries

AD-294 588 Div. 16
(TISTB/LMH) OTS price $11.00

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON ANTHRAX.
3rd Edition.
Feb 60, 143p. incl. refs.
Unclassified report

DESCRIPTORS: *Bibliography, *Diseases, *Anthrax, Bacillus anthracis, Cattle, Immunology, Disease carriers, Epidemiology, Chemotherapeutic agents, Biological stains, Viability, Bacteria.

Contents:
Diagnosis, Detection and Identification
Clinical Picture
Culture and Morphology
Nutrition, Metabolism, Enzymes
Human Pathology
Spores
Variations
Serology and Antigenic Structures
Virulence
Effect of Physical Agents
Effect of Chemical Agents
Immunology, Vaccines, Prophylaxes
Chemotherapy
General Therapy
Animal Sources and Animal Pathogenicity
Animal Pathology
Avian Sources
Insect Vectors
Aerial Infection
Water-borne Infection
Methodology
Staining
Tissue Culture
Epidemiology
General Epidemiology
Laboratory Infections
Epidemic Countries

AD-294 595 Div. 16
(TISTB/MS) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
WATER CONSERVATION THROUGH REUSE OF FLUSHING FLUID IN AN AEROBIC SEWAGE TREATMENT PROCESS, by C. F. Walters and J. A. Anderegg. Aug 62, 14p. incl. illus. 4 refs. (Rept. no. AAL TDR 62-9)
(Proj. 8246-1) Unclassified report

DESCRIPTORS: *Water, *Disposal, *Sewage, *Latrines, *Closed cycle ecological systems, Alaska, Arctic regions, Aerobiology, Processing, Sanitary engineering, Chemical analysis.

The Arctic Health Research Center was requested to design, fabricate and operate under field conditions an aerobic waste treatment system wherein the effluent is reused as the water carrier, to be used at various remote Air Force Stations in Alaska. The plant was to serve approximately 10 men. Three such units were built and installed in three different locations in Alaska, but because of the extreme difficulty in transportation, routine sampling was impossible. In August 1958, a recirculating waste treatment unit was installed near Anchorage consisting of comminution, aeration, settling and recirculation of settled fluid for flushing purposes. For 16 months, weekly samples were obtained from the latter unit and analyzed for: total solids, total volatile solids, organic and ammonia nitrogen, pH, and chlorides. In addition, the daily usage of the system was recorded along with the volume of overflow. The results of chemical analyses indicate a gradual buildup of solids, ammonia, and organic nitrogen and chlorides. With a theoretical detention time (in the aeration chamber) of 53 days, the pH remained extremely low and total solids content increased to above 20,000 mg/l. (Author)

AD-294 729 Div. 16
(TISTB/DGH) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
DATA HISTORIES OF CASUALTIES OCCURRING IN THE FALL 1959 USA-CDEC FIELD EXPERIMENT, by Marilyn Anderson, Paul Brock and others.
Oct 61, 1v. incl. tables (Rept. no. 2)
(Contract DA 49-193-md-2169)
Unclassified report

DESCRIPTORS: *Military mobilization, *Military medicine, Data, Casualties, Therapy.

Data collected in two medical field experiments performed at the United States Army Combat Development Experimentation Center, Fort Ord, California are summarized and the results analyzed. Data histories of casualties occurring in the fall 1959 field experiment are given. (Author)

AD-294 730 Div. 16
(TISTB/DGH) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
DATA HISTORIES OF CASUALTIES OCCURRING IN THE SPRING 1960 USA-CDEC FIELD EXPERIMENT, by Marilyn Anderson, Paul Brock and others.
Jan 62, 68p. incl. illus. tables (Rept. no. 3)
(Contract DA 49-193-md-2169)
Unclassified report

DESCRIPTORS: *Military mobilization, *Military medicine, Data, Casualties, Therapy.

Data collected in two medical field experiments performed at the United States Army Combat

Development Experimentation Center, Fort Ord, California are summarized and the results analyzed. Data histories of casualties occurring in the Spring 1960 field experiment are given. (Author)

AD-294 793 Div. 16
(TISTB/DGH) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
PHYSICAL INSULATION OF KOREAN DIVING WOMEN,
by D. W. Rennie, B. G. Covino, and B. J. Howell.
July 62, 19p. incl. illus. tables, 15 refs.
(Rept. no. AAL TDR 62-22)
(In cooperation with Buffalo U. School of Medicine, N. Y., Contract AF 41(657)302, Proj. 8237-39 and NSF Grant G-8794)
Unclassified report

DESCRIPTORS: *Body fats, *Exposure, *Body temperature, Women, Man, Diving, Korea, Thermal insulation, Temperature perception, Underwater.

Human cold adaptation was studied by comparing maximal body insulations (I values) of Korean diving women, non-diving women and men, and of American men and women. The diving women had significantly larger I values than Korean men, due to thicker subcutaneous fat. There was no difference in I value or subcutaneous fat thickness between the diving women and the non-diving women. The Koreans had 30% higher I values than Americans of comparable subcutaneous fat thickness, signifying greater vasoconstriction and a thicker shell of non-perfused tissue. The critical water temperature at which shivering occurred was 30 C or lower for the diving women. For other subjects of comparable fat thickness it was 31 to 34 C. This elevated shivering threshold of the diving women was the only evidence of acquired cold adaptation. The thicker subcutaneous fat of women offers more protection to cold and may be the reason why women and not men engage in diving. (Author)

AD-294 800 Div. 16
(TISTB/DGH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE POST COLD BEHAVIOR OF RIBOFLAVIN DEFICIENT RATS,
by D. A. Vaughan, L. N. Vaughan, and G. J. Klain.
July 62, 11p. incl. illus. table, 7 refs. (Rept. no. AAL-TDR 62-27)
(Proj. 8238-18)
Unclassified report

DESCRIPTORS: *Exposure, *Riboflavin, Xanthine oxidase, Rats, Behavior, Deficiency diseases.

The post-cold behavior of riboflavin-deficient rats was studied. It was observed that rats depleted at 5 C for four weeks resumed slow growth (due to fat and water deposition) upon return to 25 C. Gross symptoms of the deficiency did not appear as soon in the post-cold rats as in the warm rats. Total riboflavin losses from the liver were rapid initially, leveling out at about one-third of normal concentration, but there was little difference between groups. Liver and kidney xanthine oxidase activity did not fall as rapidly as did riboflavin, and the post-cold rats appear to maintain higher levels throughout the experiment. (Author)

AD-294 807 Div. 16
(TISTB/DGH) OTS price $8.10

Technical Library, Fort Detrick, Frederick, Md.
BIBLIOGRAPHY ON HISTOPLASMOSIS.
11 May 55, 84p.
Unclassified report

DESCRIPTORS: *Fungus infections, *Bibliography, Culture media, Pathology, Immunology, Chemotherapeutic agents, Fungi, Diseases.

Contents:
Diagnosis, detection, and identification
Clinical picture: case histories
Culture and morphology
Isolation of histoplasma capsulatum from the soil
Human pathology
Serology
Immunology
Chemotherapy
Animal pathology
Animal sources and animal pathogenicity
Epidemiology
General epidemiology
Laboratory infection
Epidemic countries

D-294 815 Div. 16
TISTB/DGH) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECT OF LOW AMBIENT TEMPERATURES ON SPECIFIC AND NONSPECIFIC RESISTANCE OF MICE TO BACTERIAL DISEASE,
by S. Marcus, F. Miya and others. Aug 62, 23p. incl. tables, 33 refs. (Rept. no. AAL TDR 62-5)
(In cooperation with Utah U. Coll. of Medicine, Salt Lake City, Contract AF 41(657)311, Proj. 8241-32)
Unclassified report

DESCRIPTORS: *Exposure, *Infections, *Bacteria, Stress (Psychology), Mice, Zymosan, Klebsiella pneumoniae, Staphylococcus, Escherichia, Effectiveness, Resistance, Immunization.

Experiments were designed to compare specific and nonspecific resistance to induced bacterial disease in mice placed at 2 C. The animals were acclimatized or unacclimatized to the low temperature. It was found that specific resistance afforded the maximal protection possible whereas nonspecific resistance was of relatively low extent. The low ambient temperature did not interfere with protection gained from specific immunization provided the cold-exposed mice were caged in small groups (10 per group) as compared to individually caged animals. The difference in results between isolated and grouped animals was not due to conservation of heat by huddling. It appears that the effect of isolation contributes to enhanced mortality following challenge. (Author)

AD-294 816 Div. 16
(TISTB/DGH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
STRESS STUDIES IN RATS FED GLYCINE CONTAINING DIETS,
by W. R. Todd. Aug 62, 10p. incl. illus. tables, 10 refs. (Rept. no. AAL TDR 62-10)
(In cooperation with Oregon U. Medical School, Portland, Contract AF 41(657)327, Proj. 7952-9)
Unclassified report

DESCRIPTORS: *Exposure, *Diet, Creatine, Glycogen, Determination, Phosphorylases, Rats, Stress (Physiology), Glycines.

When rats are fed a semisynthetic diet containing 10% glycine and then stressed (cold water swim), the animals maintain liver glycogen at a much higher level than do animals treated similarly but fed the diet without the added glycine. During a 3-hour recovery following the stress, the glycine-fed animals synthesize considerable

liver glycogen while the control-fed rats show no net deposition of liver glycogen. Muscle creatine levels were determined before stress, after stress and following recovery from stress in animals prefed creatine-control diet and creatine-glycine diet. The activity of the enzymes phosphorylase and glycogen synthetase was determined at the three times in the stress procedure in muscle from animals prefed four diets: the control, the glycine, the creatine-control and the creatine-glycine rations. Active phosphorylase activity was found to be increased in animals on all of the diets as a result of stress and remained elevated at the end of the recovery period. Glycogen synthetase activity of muscle was lowered at all times in the procedure as a result of feeding diets supplemented with glycine, creatine, or both. The variations in muscle enzyme activity did not conform to the observed changes in liver glycogen and thus do little to help explain the mechanism of the glycine effect. (Author)

AD-294 834 Div. 16
(TISTB/DGH) OTS price $3.60

Pennsylvania U., Philadelphia.
THERMAL AND METABOLIC MEASUREMENTS ON A REINDEER AT REST AND IN EXERCISE,
by H. T. Hammel and T. R. Houpt. June 62, 34p. incl. illus. tables, 9 refs.
(Contract AF 41(657)284, Proj. 8238-21)
(AAL TDR 61-54) Unclassified report

DESCRIPTORS: *Exposure, *Heat production (Biology), Metabolism, Arctic regions, Fur, Animals, Oxygen consumption, Measurement, Stress (Physiology), Body temperature.

Adaptations which equip a mammal to cope with the cold stresses of the Arctic environment must at the same time be accompanied by responses which enable it to dissipate large quantities of heat produced during exercise. Some aspects of the heat producing and heat dissipating mechanisms were investigated in the reindeer, an example of a large well adapted Arctic mammal.

AD-294 836 Div. 16, 29
(TISTB/MS) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
ARCTIC SURVIVAL RATIONS. IX. EFFECT OF A HIGH FAT DIET ON THIAMINE EXCRETION AND PLASMA CHOLESTEROL IN HUMAN SUBJECTS,
by D. A. Vaughan, L. N. Vaughan and others. July 62, 7p. incl. tables, 10 refs. (Rept. no. AAL TDR 62-28)
(AF Proj. 8238-03)
Unclassified report

DESCRIPTORS: *Military rations, *Fats, *Diet, *Thiamine, Blood plasma, Cholesterol, Ketones, Exercise, Survival, Arctic regions, Excretion.

Human subjects were used to test the effects of two simple diets of varying fat content on thiamine excretion, plasma cholesterol, ketone excretion and the oxygen cost of exercise. After subsistence on the high fat diet (60% of Calories) for two weeks, the subjects' basal excretion of thiamine and their load dose returns of urinary thiamine were significantly less than on the low fat diet (18% of Calories). This was considered to be evidence that a high fat diet has a sparing effect on the thiamine requirement of humans. In the 2-week period plasma cholesterol levels were significantly increased by subsistence on the low fat diet; no change was observed when the subjects ate the high fat diet. These effects were attributed to the predominately saturated nature of the fat in the low-fat diet, in contrast to the high fat diet in which 69% of the fat was unsaturated corn oil. No changes were observed in ketone excretion or in the oxygen cost of exercise during these experimental periods. (Author)

AD-294 881 Div. 16
(TISTB/MS) OTS price $2.60

Technical Library, Camp Detrick, Frederick, Md.
BIBLIOGRAPHY ON MELIOIDOSIS AND MALLEOMYCES PSEUDOMALLEI.
16 Oct 57, 29p. refs.
Unclassified report

DESCRIPTORS: *Malleomyces, *Bibliography, Fevers, Diseases, Epidemiology, Chemotherapeutic agents, Immunization, Pathology, Diagnosis.

AD-294 882 Div. 16
(TISTB/DGH) OTS price $4.60

Technical Library, Camp Detrick, Frederick, Md.
BIBLIOGRAPHY ON THE ROCKY MOUNTAIN SPOTTED FEVER GROUP OF RICKETTSIOSES (SUPPLEMENT).
27 Nov 56, 45p. refs.
Unclassified report

DESCRIPTORS: *Spotted fever, *Bibliography, *Rickettsia, Q fever, Typhus fever, Chemotherapeutic agents, Viability, Immunology, Epidemiology, Infections.

Contents:
Culture and morphology
Clinical picture
Chemotherapy
Viability
Serology
Virulence
Human pathology
Effect of physical agents
Effect of chemical agents
Immunization and prophylaxes - vaccines
Animal sources and animal pathogenicity
Animal pathology
Insect vectors
Tissue culture
Epidemiology
  General epidemiology
  Laboratory infections
  Epidemic countries

17. METALLURGY

AD-293 818 Div. 17, 14
(TISTM/ODN) OTS price $1.10

Martin-Marietta Corp., Denver, Colo.
NONDESTRUCTIVE TESTING. A BIBLIOGRAPHY OF ARTICLES AND REPORTS ON NONDESTRUCTIVE TESTING FOR THE YEARS 1961-1962,
comp. by Clyde Briggs. July 62, 8p. refs.
(Literature search no. 15)
Unclassified report

DESCRIPTORS: *Bibliography, Rocket cases, Glass textiles, Ultrasonics, Infrared spectroscopy, Radiographic analysis, Honeycomb cores, Metals, Plastics, Materials, Magnetism, Nondestructive testing.

Division 17 - METALLURGY

AD-293 819 Div. 17, 14, 25
(TISTM/ODN) OTS price $1.10

Martin Marietta Corp., Denver, Colo.
IMPACT TESTING AT CRYOGENIC TEMPERATURES. AN ANNOTATED BIBLIOGRAPHY,
comp. by Clyde Briggs. 12 Oct 60, 9p. refs.
(Literature search no. 10)
Unclassified report

DESCRIPTORS: *Bibliography, *Cryogenics, *Impact shock, Materials, Plastics, Elastomers, Metals, Stainless steel, Steel, Mechanical properties, Refractory materials, Alloys, Liquefied gases, Impact shock.

AD-293 841 Div. 17
(TISTM/SJR) OTS price $3.50

Westinghouse Electric Corp., Bloomfield, N. J.
PHYSICAL METALLURGY OF TUNGSTEN AND TUNGSTEN BASE ALLOYS.
Interim rept., 1 Apr 61-31 Mar 62 on Metallic Materials,
by Heinz G. Sell, George H. Keith and others.
Nov 62, 202p. incl. illus. tables, 111 refs.
(Contract AF 33(616)6933, Proj. 7351)
(WADD TR 60-37, pt. 3)
Unclassified report

DESCRIPTORS: *Tungsten, *Powder metals, *Powder alloys, Single crystals, Metallic crystals, Growth, Zone melting, Electron beams, Mechanical properties, Tensile properties, Processing, Heat treatment, Transition temperature, Grains, Tungsten alloys, Tantalum compounds, Carbides, Hafnium compounds, Thorium compounds, Oxides, Tantalum alloys, Hafnium alloys, Thorium alloys, Powder metallurgy, High temperature research, Physical properties.

The tensile properties of polycrystalline tungsten were investigated. Single crystals with a (100) orientation were grown by electron beam floating zone melting. The tensile deformation behavior of these crystals was studied from -196 to 800 C. Single crystals were worked by rolling and their recrystallization response was investigated as a function of cold work and working temperature. Twin morphology was thoroughly studied. Binary solid solution alloy single crystals of W-Ta were produced by electron beam floating zone melting from compacted ingots. Alloy single crystals containing .25% and 4% tantalum were worked and the recrystallization response was determined to be 400 to 600 C higher than that of worked pure tungsten single crystals. The tensile strength of sintered and swaged W-TaC alloys was determined at 3000 and 3500 F as a function of alloy composition (0.1-11%). Also measured at 3000 and 3500 F were the tensile strengths of the systems W-2%ThO2 and W-.5%HfO2. (Author)

AD-293 873 Div. 17
(TISTM/SJR) OTS price $3.60

(Du Pont Metals Center) E. I. Du Pont de Nemours and Co., Inc., Baltimore, Md.
THE DEVELOPMENT OF OPTIMUM MANUFACTURING METHODS FOR COLUMBIUM ALLOY SHEET. ITEM 1: SUB-CONTRACT FOR THE DEVELOPMENT OF SHEET PROCESS FOR X-110 ALLOY.
Interim progress rept. no. 8, 15 Sep-15 Dec 62,
by A. L. Mincher. 15 Dec 62, 35p. incl. illus. tables.
(Subcontract to Crucible Steel Company of America, Midland, Pa., Contract AF 33(600)39942, Proj. 7-784)
Unclassified report

DESCRIPTORS: *Niobium alloys, *Processing, Carbon alloys, Tungsten alloys, Zirconium alloys, Microstructure, Microscopy, Electron microscopy, Forging, Manufacturing methods, Mechanical properties.

Processing of columbium alloy sheet panels is complete except for sheet flattening. Two 8 inch diameter ingots of the X-110 alloy were converted by extrusion and rolling to 28 inch wide sheet at three gages 0.020, 0.040 and 0.063 inch. Initial evaluation of the sheet has indicated satisfactory gage uniformity and flatness. Target tensile properties were obtained in the 0.040 and 0.063 inch sheet, but high temperature strength of the 0.020 inch sheet was some 20% lower than obtained in the thicker gages. (Author)

AD-293 877 Div. 17, 26
(TISTM/EJH) OTS price $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE FLOW AND FRACTURE OF ZONE REFINED TUNGSTEN.
Quarterly progress rept., 21 June-30 Sep 62,
by David Benjamin and Marvin Herman. 30 Sep 62, 14p. incl. illus. tables, 31 refs.
(Rept. no. Q-B1973-1)
(Contract DA 36-034-ORD-374, Proj. 59332008)
(WAL TR 834.2/11) Unclassified report

DESCRIPTORS: *Tungsten, *Zone melting, Single crystals, Purification, Fracture (Mechanics), Brittle materials, Electron beams, Induction heating, Transition temperatures, Deformation, Impurities, Processing, Laboratory equipment.

A discussion of the brittle ductile transition and the deformation modes of tungsten is presented. The application of the electron beam techniques for purifying tungsten is compared to the induction melting technique. The construction details of an induction type zone melter is presented. (Author)

AD-294 323 Div. 17
(TISTM/SJR) OTS price $4.60

Nuclear Metals, Inc., Cambridge, Mass.
BERYLLIUM RESEARCH AND DEVELOPMENT PROGRAM.
Quarterly progress rept. 1 Apr-30 June 62,
by S. H. Gelles. 5 Nov 62, 1v. incl. illus. tables, 27 refs. (Rept. no. NMI-9522)
(Contract AF 33(616)7065, Proj. 7351)
Unclassified report

DESCRIPTORS: *Beryllium, *Metallurgy, *Crystal structure, *Manufacturing methods, Electron microscopy, Grains, Powder metallurgy, Powder metals, Zone melting, Metallurgy, Mechanical properties, Metallic crystals.

Research included studies on: (1) brittle behavior of beryllium by means of electron microscopy, (2) metallurgical factors affecting ductile-brittle transition, (3) preparation of ultra-fine beryllium powder, (4) preparation and evaluation of fine-grained beryllium, (5) recrystallization and grain growth in beryllium, (6) identification of impurities and precipitates in beryllium, and (7) preparation and evaluation of high-purity beryllium.

AD-294 345 Div. 17, 25
(TISTM/EJH) OTS price $3.00

Defense Metals Information Center, Columbus, Ohio.
THERMAL RADIATIVE PROPERTIES OF SELECTED

MATERIALS,
by W. D. Wood, H. W. Deem, and C. F. Lucks.
15 Nov 62, 194p. incl. illus. tables, refs.
(DMIC rept. no. 177, vol. 1)
(Contract AF 33(616)7747, Proj. 2(8-975))
Unclassified report

DESCRIPTORS: *Thermal radiation, *Refractory materials, *Heat resistant alloys, Metals, Data, Titanium, Titanium alloys, Stainless steel, Iron, Iron alloys, Nickel, Nickel alloys, Cobalt, Cobalt alloys, Tungsten, Tungsten alloys, Chromium, Chromium alloys, Niobium, Niobium alloys, Tantalum, Tantalum alloys, Molybdenum, Molybdenum alloys.

A compilation of data on thermal radiative properties is presented. The basic fundamentals of thermal radiation and of the methods of measuring these properties are discussed. Much of the information has previously been distributed in DMIC memoranda; however, it is consolidated in this report for the benefit of those with a broad interest in radiant heat transfer. Thermal radiative data are included for the following materials: titanium and its alloys; stainless steels; iron-, nickel-, and cobalt-base superalloys; the refractory metals (chromium, columbium, molybdenum, tantalum, and tungsten) and their alloys; coated materials for elevated-temperature service; and ceramics and graphite. (Author)

AD-294 347 Div. 17, 10
(TISTM/EJH) OTS price $1.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
COMBUSTION OF METALS,
by George H. Markstein. Nov 62, 46p. illus.
77 refs. (Proj. Squid Technical rept. no. CAL-86-P)
(In cooperation with Virginia U., Charlottesville, Contract Nonr-3623(00), Proj. NR 098-038)
Unclassified report

Presented at the 17th Annual Meeting and Space Flight Exposition, American Rocket Society, 13-18 Nov 1962, Los Angeles, Calif.

DESCRIPTORS: *Combustion, *Metals, Oxidation, Ignition, Flames, Vapors, Particles, Rocket fuels, Aluminum, Magnesium, Oxides, Reaction kinetics, Spectrographic analysis.

Contents:
Distinctive aspects of metal combustion
Low-temperature oxidation of metals
Ignition of metals
Burning of metals
Combustion of metals in propellants and propulsion devices
Reaction kinetics and mechanisms of metal combustion
Radiation and spectra of metal flames

AD-294 353 Div. 17, 30, 25
(TISTM/EJH) OTS price $1.75

Metals and Ceramics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
A COMPUTER PROGRAM FOR THE MATANO ANALYSIS OF BINARY DIFFUSION DATA.
Final rept. on Metallic Materials,
by Craig S. Hartley and Kenneth Hubbard. Nov 62, 65p. incl. illus. tables, 10 refs.
(Proj. 7351)
(ASD TDR 62-858) Unclassified report

DESCRIPTORS: *Programming, *Alloys, *Diffusion, Phase studies, Phase transitions, Digital computers, Transport properties, Mathematical analysis, Copper alloys, Nickel alloys, Brass, Tungsten alloys, Ruthenium.

A computer program for the Boltzmann-Matano solution to Fick's second law in semi-infinite binary diffusion couples is presented. The program is written in FORTRAN for the IBM 7090 digital computer. An error function curve fit is used to interpolate between and smooth experimental data, and the calculations performed on the regenerated data. Examples are given of application of the program to incremental couples with no intermediate phases and to pure metal couples with and without intermediate phases. Phase boundaries in couples with intermediate phases can also be obtained with a high degree of accuracy. By substituting lattice spacings for ordinary distance units, a correction for molal volume change due to composition differences can be programmed. (Author)

AD-294 396 Div. 17
(TISTM/RGR) OTS price $1.50

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
STRAIN AGING AND DELAYED FAILURE IN HIGH-STRENGTH STEELS.
Rept. for 15 Oct 61-14 Oct 62,
by E. A. Steigerwald and G. L. Hanna. Nov 62, 48p. incl. illus. tables, 29 refs.
(Contract AF 33(657)7512, Proj. 7351)
(ASD TDR 62-968) Unclassified report

DESCRIPTORS: *Steel, *Stainless steel, Aging; Deformation, Temperature, Controlled atmospheres, Tensile properties, Tests, Reaction kinetics, Mechanical properties, Fatigue (Mechanics), Failure (Mechanics).

Spontaneous strain aging which occurs during tensile testing was examined for several high-strength steels. The results of smooth and notch tensile tests indicated that significant strain aging effects occurred in most high-strength steels in the 300 to 800 F temperature range, and this behavior was analogous to 'blue brittleness' in mild steels. Constant load, stress rupture tests were conducted on the steels to determine the possible relationship between strain-aging embrittlement and delayed failure. Only the 300 M steel tested at 400 F exhibited an appreciable degree of delayed failure. This embrittlement was extremely sensitive to test environment and was eliminated when tests were conducted in argon. Although strain aging was not a sufficient conditon to imitiate delayed failure, it appeared to increase the severity of the environmental effects in the particular range where sufficient interstitial mobility existed. (Author)

AD-294 426 Div. 17, 25, 4
(TISTM/ODN) OTS price $1.10

California U., Berkeley.
HEAT CAPACITY OF LIQUID ALLOYS.
Final rept.,
by Raymond L. Orr and Ralph Hultgren. 15 Dec 62, 6p. refs. (Series no. 155, Issue no. 4)
(Contract Nonr-22263, Proj. NR 031621)
Unclassified report

DESCRIPTORS: *Alloys, *Liquid metals, *Bismuth, *Indium, Indium alloys, Bismuth alloys, Tin alloys, Thermodynamics, Eutectics, Melting, Calorimeters, Specific heat.

A particularly simple method of making the usually difficult measurements of heat capacities of metals and alloys has been developed. Measurements are made in a modified liquid tin solution calorimeter originally designed for the purpose of determining alloy heats of formation. The liquid sample is contained in a thin-walled molybdenum crucible which is supported inside an isothermal

copper jacket. A known endothermic heat is introduced by dropping into the sample a cold specimen of an inert metal of known heat content such as molybdenum, or, in the case of a pure metal sample, a solid specimen of the sample metal itself. The temperature change and heat transfer correction are determined using the same techniques perfected in heat of solution studies. In this manner direct heat capacity measurements may be carried out up to about 800 K, the present upper temperature limit for satisfactory performance of the calorimeter. (Author)

AD-294 431 Div. 17, 4/
(TISTM/ODN) OTS price $1.60

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
THE STRENGTH AND PLASTICITY OF ANISOTROPIC METALS.
Quarterly rept. no. 1,
by W. A. Backofen and W. F. Hosford, Jr.
30 Sep 62, 14p. incl. illus. tables.
(Contract DA 19-020-ORD-5719, Proj. 59332008)
(WAL TR 834.12/2) Unclassified report

DESCRIPTORS: *Metals, Plasticity, Hardening, Theory, Loading, Steel, Titanium, Copper, Brass, Deformation, Stresses.

Emphasis was placed on the role of plastic anisotropy in determining the behavior of textured metals in applications involving combined-stress loading, as well as the possibilities of property improvement through texture control. Initial experimental results in plane strain are presented for several materials. In general, these have given good agreement with predictions from anisotropic continuum theory. (Author)

AD-294 440 Div. 17
(TISTM/EJH) OTS price $1.60

New York U., Coll. of Engineering, N. Y.
DEVELOPMENT OF TOUGH, HIGH STRENGTH ALPHA-BETA TITANIUM-BASE ALLOYS AT 240,000-260,000 PSI YIELD STRENGTH LEVEL.
Quarterly progress rept. no. 1, 25 June-25 Sep 62,
by P. A. Farrar and H. Margolin. 25 Sep 62,
18p. incl. table, 5 refs.
(Contract DA 30-069-ORD-3690, Proj. 59332008)
(WAL TR 401/303) Unclassified report

DESCRIPTORS: *Titanium alloys, High pressure research, Mechanical properties, Aluminum alloys, Vanadium alloys, Tin alloys, Copper alloys, Iron alloys, Transition temperature, Melting, Electric arcs.

In order to develop titanium alloys with 0.1% yield strength in the range 240,000 to 260,000 psi, a series of 15 eight-pound alloys are being prepared at two interstitial levels. Following their evaluation 4 fifty-pound alloys will be prepared and tested both as sheet and bar stock. Weldability studies will be performed on the sheet material. Melting of the eight-pound ingots is in progress and beta transus temperatures have been determined for all the compositions on 25-g buttons. (Author)

AD-294 453 Div. 17, 26
(TISTM/EJH) OTS price $5.00

Temco Electronics, Dallas, Tex.
MECHANICAL PROPERTIES OF MATERIALS FABRICATED BY SHEAR FORMING.
Final rept., Feb 61-June 62 on Materials Applications,
by Frank Jacobs. Aug 62, 345p. incl. illus. tables, 15 refs. (Rept. no. 00.384)
(Contract AF 33(616)7874, Proj. 7381)
(ASD TDR 62-830) Unclassified report

DESCRIPTORS: *Deformation, *Hydroforming, *Alloys, *Heat resistant alloys, Stainless steel, Steel, Titanium alloys, Aluminum alloys, Nickel alloys, Cobalt alloys, Chromium alloys, Microstructure, Manufacturing methods, Heat treatment, Mechanical properties, Tensile properties, Hardness, Shear stresses, Conical bodies.

The effect of shear forming on the mechanical properties was determined for 32 alloys. The different classes of alloys included austenitic, ferritic, martensitic and precipitation hardening types of stainless steels; super alloys; Ti alloys; alloy steels; and Al alloys. All materials were shear formed into cones with room temperature reductions of 20, 30, 40, 50, 60, and 70 percent. Each cone was formed with one pass of the shear form roller. Original material properties, properties after shear forming, and properties after shear forming plus heat treatment were determined. All materials increased in strength with increasing amounts of cold reduction - the increase being a function of the work hardening characteristic of the alloy. A full heat treatment subsequent to shear forming essentially restored the original heat treat properties of the super alloys, alloy steels, and Al alloys. Shear formed 17-7 PH and PH 15-7 Mo stainless steels showed significant losses with the subsequent heat treatment. (Author)

AD-294 459 Div. 17
(TISTM/ODN) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
FRACTURE OF METALS.
Summary rept., 13 Nov 61-13 Nov 62,
by W. Rostoker. 19 Nov 62, 41p. incl. illus. tables, 19 refs. (Rept. no. ARF-B183-12)
(Contract DA 11-ORD-022-3108)
Unclassified report

DESCRIPTORS: *Alloys, *Aluminum alloys, Stresses, Corrosion, Dispersion hardening, Brass, Liquid metals, Mercury, Magnesium alloys, Aging, Grains (Metallurgy), Failure (Mechanics), Sodium compounds, Chlorides, Chromates, Hydrochloric acid, Mechanical properties, Penetration, Steel, Heat treatment, Fracture (Mechanics).

Research results show that the mercury embrittlement of an Al-4 1/2 Mg alloy is related to the strain-aging behavior of this alloy and that strain aging produces embrittlement effects which are similar to precipitation hardening. The temperature dependence of stress-corrosion cracking is shown in two cases to be small compared to that expected for corrosion processes and more closely comparable to that encountered in liquid-metal embrittlement. There is also shown to be a close similarity between liquid metal and stress-corrosion cracking in their strong dependence on small degrees of plastic prestrain. Evidence is presented in terms of kinetics and appearance of intergranular penetration without external application of stress to suggest that large stresses exist between grains of an age-hardened polycrystalline aluminum alloy. (Author)

AD-294 511 Div. 17
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE PREPARATION OF A POWDER-METALLURGY COBALT-TUNGSTEN ALLOY FOR INSTRUMENT MAKING,
by A. V. Savin and Yu. A. Eyduk. 23 Nov 62,
10p. incl. illus. tables, 2 refs. (Trans. no.

FTD-TT-62-1265 from Russian Book, Trerdyye Splavy, Moska, 2:pp. 15-23, 1960)
Unclassified report

DESCRIPTORS: *Powder metallurgy, *Tungsten alloys, *Alloys, *Sintered alloys, *Cobalt alloys, Microstructure, Density, Reduction, Phase studies, Preparation, Heat treatment, Powder metals, Sintering.

Various regimes for the preparation of a cobalt-tungsten alloy by powder-metallurgy methods have been tested. The fundamental parameters affecting the preparation of a dense single-phase alloy with a reduced gas content have been found. An alloy of cobalt with tungsten possesses, after appropriate thermomechanical treatment, improved strength and wear-resistance properties. Since it is also a corrosion-resistant material, this alloy has been used in place of alloy steel, e.g., in the building of vibration-proof axles in measuring instruments. (Author)

AD-294 517 Div. 17
(TISTM/SJR) OTS price $12.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEMS IN METALLURGY AND PHYSICS OF METALS (Problemy Metallovedeniya I Fiziki Metallov).
12 Dec 62, 160p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1290 from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Literatury Po Chernoy I Tsvetnoy Metallurgii, Moskva, pp. 34-92, 156-174, 231-245, 281-306, 1962)
Unclassified report

DESCRIPTORS: *Metallurgy, *Nickel alloys, Aluminum alloys, Cobalt alloys, Chromium alloys, Copper alloys, Iron alloys, Molybdenum alloys, Elasticity, Electron microscopy, Crystal structure, Fracture (Mechanics), Lattices, Steel, Austenite, Martensite, USSR.

This translation of Russian work covers the following fields: (1) variation in the modulus of elasticity in nickel alloys containing varying amounts of aluminum, copper, cobalt, chromium, iron, and molybdenum with heat treatment; (2) brittleness in steel with low-temperature tempering; (3) electron microscope study of fractures in failure of steel and iron; and (4) study of structure of steel involving changes between austenitic and martensitic forms.

AD-294 579 Div. 17
(TISTM/EJH) OTS price $2.75

Climax Molybdenum Co. of Michigan, Detroit.
INVESTIGATION OF MOLYBDENUM- AND TUNGSTEN-BASE ALLOY SHEET MATERIALS.
Final rept., May 61-July 62,
by Gordon D. McArdle, Robert Q. Barr, and M. Semchyshen. 15 Jan 63, 144p. incl. illus. tables, 12 refs.
(Contract NOw 61-0581-d)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Tungsten alloys, *Sheets, Melting, Electric arcs, Manufacturing methods, Extrusion, Rolling mills, Heat treatment, Microstructure, Mechanical properties, Hardness, Tensile properties, Crystallization, Deformation, Creep, Rupture, Niobium alloys, Carbon alloys, Titanium alloys, Zirconium alloys, Vacuum furnaces, Casting, Refractory materials.

Sheet stock nominally 0.05 inch in thickness by approximately 8 inches in width and 20 inches in length was prepared by several working schedules representing the following refractory alloys: (1) Mo + 1.35% Nb + 0.028% C; (2) Mo + 1.17% Ti + 0.27% Zr + 0.15% C; (3) Mo + 25.4% W + 0.10% Zr + 0.037% C; (4) Mo + 49.1% W + 0.014% C; and (5) W + 3.5% Mo + 0.015% C. Adequate recoveries of sound stock were obtained for the first three alloys listed; the yield of sound rolled sheet from the 50 Mo-50 W and W + 3.5% Mo alloys were, however, rather low. Bend transition temperatures and tensile and creep-rupture strengths of sheets rolled in air were relatively insensitive to finishing temperatures. Tensile transition temperatures were, however, lower for the sheets finished at the lower temperatures. The surfaces of sheets rolled in the InFab facility were found to be high in oxygen content. As a result, sheets processed in this manner displayed bend transition temperatures well above those of sheets of similar base composition rolled in air in a conventional manner. Removal of the contaminated surface layer by chemical-milling reduced the transition temperatures of the InFab-rolled sheets to values comparable to those of the air-rolled materials. (Author)

AD-294 584 Div. 17, 26
(TISTM/EJH) OTS price $3.60

Sylvania Electric Products, Inc., Towanda, Pa.
DEVELOPMENT AND PRODUCTION OF IMPROVED MOLYBDENUM SHEET BY POWDER-METALLURGY TECHNIQUES.
Interim rept. no. 17, 1 Aug-30 Sep 62,
by Roger B. Bargainnier. 31 Dec 62, 32p. incl. illus. tables.
(Contract NOa(s) 60-6018-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Sheets, Powder alloys, Titanium alloys, Carbon alloys, Heat treatment, Sintering, High temperature research, Rolling mills, Mechanical properties, Tensile properties.

Processing experiments to optimize the properties of powder-metallurgical Mo-0.5Ti-0.03C sheet were completed. The high-temperature strength of this sheet can be improved by an in-process re-solution heat treatment when it is employed with a proper rolling schedule. Sintering-temperature and carbon-concentration experiments confirmed previously reported results. The per cent reduction per pass during the breakdown of sintered billets does not appreciably affect the high-temperature properties of the sheet. A titanium concentration of 0.5% appears to be adequate. (Author)

AD-294 619 Div. 17, 26
(TISTM/EJH) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
IMPROVED PRODUCTION OF POWDER METALLURGY ITEMS.
Interim technical documentary progress rept., 1 Oct-31 Dec 62,
by K. Farrell and N. M. Parikh. Jan 63, 16p. incl. illus. tables (Rept. no. ARF-B247-6)
(Contract AF 33(657)9140)
(ASD TDR 7-911, vol. 2)
Unclassified report

DESCRIPTORS: *Powder alloys, *Powder metallurgy, *Atomization, *Molybdenum alloys, Powder metals, Liquid metals, Zirconium alloys, Titanium alloys, Iron alloys, Nickel alloys, Argon.

The early stages of an investigation of the production of superalloy items by powder metallurgy techniques are discussed. Three superalloy powders (Inco 713C, Udimet 700, PH15-7Mo) were made by inert gas atomization of the liquid alloys. The atomizing conditions used and the properties of the powders so produced are presented. The

powders ure fine, have good flow characteristics and can be made with low interstitial impurities. These powders may be compacted and sintered by ordinary methods. The technique employed in the synthesis of a molybdenum-base superalloy is outlined. Some difficulty may be encountered with the PH 15-7Mo alloy, but it is possible that long time, low sintering temperature treatments may minimize this problem. The phenomenon noted in the sintering tests on this alloy may be related to the evolution of a volatile phase from the alloy, or may be connected in some way with the high gas content of the metal. (Author)

AD-294 661 Div. 17, 26
(TISTM/RGR) OTS price $4.60

General Electric Co., Cincinnati, Ohio.
INVESTIGATION OF THE PHYSICAL METALLURGY OF JOINING TUNGSTEN AND COLUMBIUM.
Quarterly progress rept. no. 6,
by W. R. Young, J. W. Clark, and E. S. Jones
31 Aug 62, 63p. incl. illus. tables, 8 refs.
(Rept. no. DM62-217; AEC rept. no. NP-12144)
(Contract AF 33(616)7484)
Unclassified report

DESCRIPTORS: *Tungsten, *Tungsten alloys, *Niobium alloys, Sheets, Welding, Microstructure Fracture (Mechanics), Grains (Metallurgy), Welded joints, Welds, Temperature, Heat treatment, Alloys, Powder alloys, Powder metals, Brazing.

Metallographic analysis of 14 new braze alloys for Nb was completed. Studies on the effect of brazing parameters and testing variables on joint re-melt temperature were continued. Applied stress during testing was the most important variable in control of failure temperature. New braze alloys for W were evaluated for melting range. Electron beam melted ingots of W-Hf and W-Hf-C alloys were successfully worked to sheet. Gross thermal response characteristics were established; tests to determine transition temperatures in the wrought, fully recrystallized, and fusion welded conditions were begun. No evidence of significant grain boundary hardening was seen in traverses of symmetrical, randomly oriented indenters. Results show earlier indications of grain boundary hardening were related to a large hardness anisotropy. Annealing unalloyed W in a C-free, ultra-high vacuum environment improves low-temperature ductility. Tensile shear strength of lap joints diffusion bonded between Nb-1Zr and 316 SS, Nb-1Zr to Cu, and Cu to 316 SS was determined. More experiments confirmed that Be and 316 SS were bonded. Diffusion of Be into 316 SS results in a brittle joint. The effect of Cr as a diffusion barrier in the Mo-0.5 Ti/R-41 and Mo-0.5 Ti/L-605 systems was investigated. (Author)

AD-294 774 Div. 17, 26
(TISTM/RGR) OTS price $2.50

Budd Co., Philadelphia, Pa.
DEVELOPMENT OF AUTOMATIC QUALITY CONTROL FOR RESISTANCE WELDS IN ALUMINUM ALLOYS. PHASE II. MODIFICATION OF CIRCUITRY AND EVALUATION OF A FEEDBACK WELD CONTROL FOR RESISTANCE SPOT WELDING ALUMINUM ALLOYS,
by Richard P. Hurlebaus. 20 Nov 62, 108p. incl. illus. tables.
(Contract DA 36-034-QRD-3217)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Electric welding, *Spot welding, Alloys, Welding, Quality control, Spot welds, Automation, Resistance, Manufacturing methods, Control, Circuits, Laboratory equipment, Welds.

Three principles for weld feedback control of resistance spot welding of aluminum alloys are: constant electrode voltage, constant weld current, and weld zone resistance change. The latter principle proved to be the most reliable signal for a feedback system. The weld control circuits for a single phase feedback system were modified to produce a laboratory working model of a control for the three phase welding machine. The weld tests indicated the feedback control corrected for changes in the weld zone resistance, as the weld zone resistance decreased with the weld growth or development. This was in accordance with the correlation that as the weld grew larger the weld zone resistance decreased in a predictable and reliable manner. The weld control system performed satisfactorily during the tests to maintain weld size and strength during a qualification-type weld test. (Author)

AD-294 891 Div. 17, 26
(TISTM/ODN) OTS price $6.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
MOLYBDENUM SHEET ROLLING PROGRAM.
Interim rept. no. 16, 26 Jan-25 Apr 62,
by W. A. McNeish. 25 Apr 62, 55p. incl. illus. tables.
(Contract NOa(s) 59-6142-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Sheets, Alloys, Titanium alloys, Forging, Manufacturing methods, Hardness, Heat treatment, Deformation, Tensile properties, Melting, Tests, Microstructure, Rolling mills.

Difficulties were encountered in reproducing desirable properties of Mo+0.5%Ti in initial pilot production runs. The problem is not fully resolved to date. Direct hot forging of five inch diameter Mo+0.5%Ti ingots was accomplished and sheet product evaluated. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-294 633 Div. 18, 31, 12
(TISTW/PCR) OTS price $8.60

George Washington U., Washington, D. C.
POLARIS ALLOWANCE LIST INPUT DATA,
by Marvin Denicoff, Joseph Fennell and others.
18 Jan 63, 83p. incl. illus. tables (Serial no. T-154; Polaris Logistics Studies no. 2)
(Contracts Nonr-76103, Proj. NR 345 107, Nonr-76105, Proj. NR 047 001 and Nonr-76106, Proj. NR 347 008)
Unclassified report

DESCRIPTORS: *Logistics, *Supplies, *Submarines, Guided missiles (Underwater to surface) Computers, Programming, Tables, Mathematical computer data.

The object of this paper is to provide a careful description of data which are presently available for Fleet Ballistic Missile submarine allowance list determinations. The paper has been written for use in evaluating various proposed allowance list methodologies where one has to be able to specify precisely the range for the measurements comprising the evaluation. Precise definitions of data entries are given and layouts are prescribed for automatic data processing records so that it is possible to define an allowance list candidate. This is a part application

which leads to acceptable arithmetical input for an allowance list optimization model. Various properties are developed for allowance list candidates and standard terminology is adopted accompanied by appropriate notation. The paper concludes with summaries of certain data for the case of USS GEORGE WASHINGTON (SSB(N) 598). (Author)

AD-294 643 Div. 18, 15
(TISTP/TL) OTS price $5.60

George Washington U., Washington, D. C.
NUMERICAL REALIZATION OF ATTRITION GAMES,
by Ross Edgar Tomlinson. 11 Jan 63, 44p. incl. illus. tables, 9 refs. (Serial no. T-155)
(Contracts Nonr-76103, Proj. NR 345 107, Nonr-76105, Proj. NR 047 001 and Nonr-76106, Proj. NR 347 008)
Unclassified report

DESCRIPTORS: *Games theory, *Probability, *Lanchester equations, Matrix algebra, Information retrieval, Numerical analysis, Tables, Combat.

A set of numerical experiments on a class of zero-sum two-person games which are not matrix games are described. The methods used in the construction and solution of these games are given in detail. The existence of a closely related matrix game is established, certain solutions to both types are exhibited, and properties of the solutions are discussed. (Author)

AD-294 789 Div. 18
(TISTB/DGH) OTS price $1.60

United States Army, Alaska.
USARAL COMBAT DEVELOPMENTS ACTIVITIES REPORT
1 OCTOBER-31 DECEMBER 1962.
21 Jan 63, 7p. tables.
Unclassified report

DESCRIPTORS: *Army operations, *Armed forces maneuvers, Vehicles, Trafficability, Military equipment, Military requirements, Military mobilization, Arctic regions, Logistics.

AD-294 857 Div. 18, 32
(TISTB/DGH) OTS price $21.00

American U., Washington, D. C.
A COUNTERINSURGENCY BIBLIOGRAPHY,
by D. M. Condit, Barbara Reason and others.
Jan 63, 332p.
Unclassified report

DESCRIPTORS: *Guerrilla warfare, *Warfare, *Bibliography, Social sciences, Military operations, Logistics, Resistance, Countermeasures.

Contents:
Fundamental elements of counterinsurgency
The insurgency problem
Strategic theory
US posture
Administrative matters
Intelligence and counterintelligence
Population management
Antiguerrilla warfare
Legality and morality
Historical models of counterinsurgency
Pre-world war II experiences
World War II: Axis counterinsurgency
Post World War II cases

19. NAVIGATION

AD-294 325 Div. 19, 12
(TISTW/JEA) OTS price $1.60

Space Technology Labs., Los Angeles, Calif.
INERTIAL COMPONENTS STUDY.
Final rept., 1 July 61-30 June 62,
by T. A. Fuhrman. 30 June 62, 9p. incl. illus. 23 refs. (Rept. no. 6120-J609-RU000)
(Contract AF 04(694)1)
(BSD TR-61-8) Unclassified report

DESCRIPTORS: *Inertial guidance, *Inertial navigation, *Guided missile simulators, *Accelerometers, Specifications, Flight testing, Centrifuges, Auto gyros, Tests, Test equipment, Velocity, Acceleration, Motion, Ferromagnetic materials, Guided missiles, Gyro stabilizers.

Evaluations of inertial components used in the ballistic missile weapons systems were conducted; testing methodologies and measurement techniques used in the evaluation of precision gyros and accelerometers were studied; knowledge of the state-of-the-art of inertial components was maintained. Additionally, a significant state-of-the-art achievement was accomplished in subjecting a gas spin bearing gyro to a simulated ballistic missile acceleration environment. Further work was done in the area of precision accelerometer centrifuging. (Author)

AD-294 365 Div. 19, 33
(TISTA/GEC) OTS price $8.60

Federal Aviation Agency, Atlantic City, N. J.
EVALUATION OF THE TERMINAL RADAR SERVICE AREA CONTROL CONCEPT.
Final rept.,
by D. Bottomley, R. Hansen and others. Sep 62, 91p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Air traffic control systems, Simulation, Ground controlled approach radar, Effectiveness, Human engineering, Management engineering, Airport radar systems.

A study was made of the Air Traffic Service Terminal Radar Service Area concept and associated plan to provide positive separation for air traffic in high-activity terminal areas. A hypothetical terminal area with representative traffic was simulated, and control was performed by Air Traffic Service personnel presently engaged in active control at field facilities. The operational plan, including placement of equipment and positions of operation, procedures, and personnel staffing, was evaluated and further developed by exploratory testing. Comparative tests were made of several conditions and evaluated to determine effects on the Terminal Radar Service Area. Results indicated that the basic concept was feasible, and that operational plans can be developed for implementation in most high-activity terminal areas in the field. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-293 864 Div. 20, 30
(TISTP/WH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
COMPARISON OF MONTE CARLO CALCULATIONS WITH

EXPERIMENTAL RESULTS FOR THE PROPAGATION OF GAMMA RAYS NEAR AN AIR-GROUND INTERFACE,
by J. I. Marcum. Dec 62, 19p. incl. illus. 4 refs. (Research memo. no. RM-3399-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Numerical methods and procedures, *Gamma rays, *Dosage, Radiation effects, Propagation, Digital computers.

The RAND gamma ray Monte Carlo code is used to predict dosages from point isotropic monoenergetic sources of 1.28 Mev and 0.661 Mev near an air-ground interface. These results are compared with experimental results for identical geometry obtained by the Nuclear Defense Laboratory. In general, the agreement between the Monte Carlo estimates and the experimental results is quite good. (Author)

AD-293 985 Div. 20
(TISTP/JW) OTS price $1.60

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
(No title).
Final rept., 1958-1962,
by R. Levi Setti and V. L. Telegdi. 1962, 12p. refs.
(Contract AF 49(638)209)
Unclassified report

DESCRIPTORS: *Nuclear physics, *Particles, Acceleration, Energy, Deterioration, Cosmic rays, Theory, Bevatrons.

AD-293 989 Div. 20, 15
(TISTP/TL) OTS price $2.60

Case Inst. of Tech., Cleveland, Ohio.
THEORY OF INVERSE MOMENTS,
by Zakkula Govindarajulu. Sep 62, 24p. 14 refs.
(Case Statistical Lab. pub. no. 1066)
(Grant AFOSR 62-72)
Unclassified report

DESCRIPTORS: *Particles, *Nuclear moments, *Gamma rays, *Beta particles, *Probability, Real variables, Statistical functions, Series, Sequences, Determinants, Integral equations, Statistical distribution, Functions, Physical properties, Inequalities, Theory.

The characteristic function for inverse moments called the inverse characteristic function is defined. Liafounov's inequality for inverse moments is obtained. Various properties, in particular, the uniqueness property (also called the inversion formula), limit and continuity properties, are studied. Illustrations are provided wherever necessary. Many results admit multivariate generalizations. Inverse order statistics are defined. Also, some applications of inverse moments are considered. (Author)

AD-294 019 Div. 20
(TISTP/JW) OTS price $8.60

Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
ON SITE RADON STUDIES IN SURFACE SOILS - PROJECT VELA.
Final rept.
6 Dec 62, 93p. incl. illus. tables, 11 refs.
(Rept. no. B-2516)
(Contract AF 49(638)1110)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Seismic waves, Earth, Soils, Dosimeters, Uranium, Thorium, Radiation effects, Blast, Detectors, Underground explosions, Detection.

AD-294 104 Div. 20
(TISTP/JW) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
A SEMIEMPIRICAL FORMULA FOR DIFFERENTIAL DOSE ALBEDO FOR GAMMA RAYS ON CONCRETE,
by A. B. Chilton and C. M. Huddleston. 16 Nov 62, 19p. incl. illus. 7 refs. (Technical rept. no. R 228)
(Proj. Y-F011-05-329(b))
Unclassified report

DESCRIPTORS: *Concrete, *Gamma rays, Albedo, Scattering, Energy, Compton effect, Numerical methods and procedures, Shielding, Dosimeters.

A semiempirical formula is developed which yields values for the differential dose albedo of gamma rays on concrete. Gamma rays of incident energies 0.2, 0.5, 1.0, 2.0, 4.0, 6.0, and 10.0 Mev are considered. Results of the formula are compared with values derived from Monte Carlo calculations for the backscattering of gamma rays from a semi-infinite slab of concrete. Results show that a two-parameter formula gives satisfactory agreement with the Monte Carlo calculations. The principal assumption involved in the theoretical analysis is that the actual reflection process can be approximated by two terms, one involving a single Compton scattering event, and the other involving isotropic scattering. (Author)

AD-294 322 Div. 20
(TISTP/JW) OTS price $3.60

Solid State Radiations, Inc., Los Angeles, Calif.
RADIATION DAMAGE EFFECTS IN SEMICONDUCTOR NUCLEAR PARTICLE DETECTORS.
Final rept.,
by W. Newell, Jr., G. Baladjanian and F. P. Ziemba. Aug 60, 38p. incl. illus. table, 5 refs.
(Rept. no. NP-12159)
(Contract DA 49-186-ORD-1013)
Unclassified report

DESCRIPTORS: *Particles, *Radiation effects, Measurement, Semiconductors, Voltage, Nuclear forces, Silicon, Fluxmeters, Noise analyzers, Gamma rays, Detection, Damage control.

The effects of fast neutrons and Co60 gammas on semiconductor nuclear particle detectors were studied. Commercially available silicon p-n junction detectors as well as silicon surface barrier detectors were irradiated with Co60 gammas to a total dosage of 10 to the 7th power roentgens and irradiated with 14 Mev neutrons to a total integrated flux of 10 to the 13th power neutrons. The effects of radiation damag on the detectors were determined by measuring the current-voltage characteristics, the noise versus voltage characteristic, and the capacitance-voltage characteristic as a function of the intergrated dose. These characteristics are important in the operation of these devices as nuclear particle detectors. (Author)

AD-294 324 Div. 20
(TISTP/JW) OTS price $4.60

Solid State Radiations, Inc., Los Angeles, Calif.
A PROTON RECOIL NEUTRON SPECTROMETER UTILIZING A SEMICONDUCTOR RADIATION DETECTOR.
Final rept.,
by S. S. Friedland, F. P. Ziemba, and E. L. Zimmerman. 16 Nov 62, 1v. incl. illus. tables.
(Rept. no. NP-12226)
(Contract DA 49-186-ORD-1013)
Unclassified report

DESCRIPTORS: *Radiation instruments, *Neutron spectrometers, Semiconductors, Recoil atom, Radiators, Noise analyzers, Instrumentation, Measurement, Detection, Protons.

A proton recoil neutron spectrometer utilizing a thin hydrogenous radiator and a semiconductor detector has been built and evaluated. The proton energy spectrum emitted from the radiator is observed by the detector and low noise amplifier system and displayed by a multichannel analyzer. Two low noise amplifiers have been designed and constructed. The first is a Nuvistor hybrid amplifier with a noise level equivalent to 4 kev FWHM. The second is a fully transistorized cascode amplifier with a FWHM in the range of 8 Kev. The proton recoil instrument has been evaluated and found to have an upper energy cut off due to the (n,p) reaction in silicon above 6 Mev. The lower limit is set by the hydrogenous radiator and the noise level of the detector-amplifier system and the entrance window of the detector. A theoretical study based on an empirical slowing down relationship for protons was developed in order to predict the detailed response of the system having a range of radiator thicknesses and geometries. (Author)

AD-294 331 Div. 20
(TISTP/JW) OTS price $1.60

Mitre Corp., Bedford, Mass.
ELASTIC RAYLEIGH WAVE DISPLACEMENTS DUE TO NUCLEAR BLASTS,
by Melvin L. Baron and Ronald Check. Sep 62, 16p. incl. illus. 6 refs. (Rept. nos. SR-58; NP-12146)
(Contract AF 33(600)39852)
Unclassified report

DESCRIPTORS: *Nuclear explosions, Elasticity, Shock waves, Diffraction, Pressure, Mathematical analysis, Displacement reactions.

Free field and diffraction phenomena in solids with special applications to ground shock phenomena and shock attenuation are presented. Results are presented for the displacements due to Rayleigh waves which are produced by transient normal surface pressure distributions on a semi-infinite elastic half-space. Expressions for the Rayleigh wave displacements produced by a concentrated load on the surface of the medium are used as influence functions to construct, by means of suitable integrations in space and time, the corresponding quantities produced by the pressure distributions from a nuclear burst. Numerical results are presented at various depths and locations in the medium. A discussion of these results and of the applicability of the theory to actual situations is presented. (Author)

AD-294 382 Div. 20, 15
(TISTP/TL) OTS price $6.60

Michigan U., Ann Arbor.
THREE SOLUBLE PROBLEMS IN LINEAR TRANSPORT THEORY,
by Richard Edward Aamodt. Aug 62, 58p. 19 refs.
Unclassified report

DESCRIPTORS: *Neutrons, *Integral transforms, *Atmosphere model, *Spheres, *Quantum mechanics, *Functions, Green's functions, Density, Kinetic theory, Exosphere, Continued fractions, Partial differential equations, Neutron cross sections, Integral equations, Transport properties, Particles, Motion, Gravity, Transformations (Mathematics).

Three exactly soluble problems in linear transport theory are considered in this study. In the first problem, the one velocity, time independent, isotropic scattering, neutron transport equation with r-1 cross sections is solved exactly by two-sided Laplace transforms. The homogeneous solutions and the Green's functions are exhibited for both the infinite medium and the finite sphere. The diffusion approximation is compared to the exact result. In the second problem, a typical translationally invariant linear transport problem for a half-space is solved by the eigenfunction method. Using some derived identities for the solution of the associated homogeneous Hilbert problem, the usual cumbersome integrals occurring in half-space problems can be reduced to a simple form. For the third problem the particle density of a simple model of the exosphere is obtained by solving exactly the collisionless Boltzmann equation. The main point of the solution is that it is a discontinuous, multi-valued function of the constants of motion. Results agree with those of other methods based on Newtonian mechanics. (Author)

AD-294 386 Div. 20
(TISTP/JW) OTS price $8.60

Palmer Physical Lab., Princeton U., N. J.
ANGULAR DISTRIBUTION OF THE PRODUCTS OF THE Ke_3 MESONIC DECAY,
Report on Cosmic Ray and Elementary Particles Group,
by Paul E. Condon. 15 Dec 62, 89p. incl. illus. tables, 6 refs. (Technical rept. no. 32)
(Contract Nonr-185806)
Unclassified report

DESCRIPTORS: *Mesons, Radiation centers, Beta decay, Tensor analysis, Cerenkov radiation, Cosmic rays, Potassium, Deterioration.

AD-294 555 Div. 20, 2
(TISTP/JW) OTS price $3.60

Isotopes, Inc., Westwood, N. J.
PROJECT STAR DUST.
Quarterly rept. no. 1,
by James P. Friend and Herbert W. Feely.
1 Aug 61, 30p. incl. illus. tables, 7 refs.
(Contract DA 49-146-xz-079)
(DASA rept. no. 1301) Unclassified report

DESCRIPTORS: *Radioactive analysis, *Radiation effects, *Radioactive fall-out, Radiochemistry, Air, Particles, Mathematics, Model tests, Sampling, Atmosphere.

The goal of Project Star Dust is to construct a model of world wide fallout behavior from which predictions can be made of atmospheric burdens, ground burdens and the biological doses resulting from all kinds of releases of radioactivity placed in the atmosphere as a result of military use of atomic energy. To that end, Star Dust has been conceived as a two-faceted project. One facet consists of radiochemical and particle analyses of stratospheric air filter samples collected by U-2 aircraft. The other facet is a meteorological study designed to produce a (mathematical) model of atmospheric processes governing the distribution of world wide fallout from injections of radioactive material. The two facets are not independent of each other, however. The results of the radiochemical and particle analyses will be used, in conjunction with data obtained in the High Altitude Sampling Program, to provide a basis for establishing the model. The results of certain radiochemical

analyses performed on filter samples collected under HASP are presented. Also presented is a mathematical treatment of the first order kinetics model of the stratosphere which was used in HASP to make predictions of future fallout levels under the assumptions of continued testing. (Author)

AD-294 564 Div. 20
(TISTM/EJH) OTS price $1.10

Florida U., Gainesville.
THE NUCLEAR PROPERTIES OF RHENIUM.
Quarterly technical progress rept. no. 4, 8 Sep-8 Dec 60,
by John A. Wethington, Jr., R. A. Karam, and C. A. Bisselle. 8 Dec 60, 7p. incl. illus. tables, 4 refs.
(Contract NOa(s) 60-6021-c)
Unclassified report

DESCRIPTORS: *Rhenium, *Nuclear reactions, *Gamma rays, Neutron capture gamma rays, Thermal neutrons, Photons, Radiochemistry, Separation, Radioactive isotopes.

The resolution of a scintillation spectrometer is from about 6 to 20 percent; consequently, there is no possibility of improving the data of Groshev et al with the present equipment. Since the activation cross section of rhenium is known, the spectrum of gamma rays from thermal neutron capture is known, and the energy and half-life of the decay gamma photons are known, one can calculate the magnitude of secondary gamma photon production in rhenium shields for thermal reactors. With the emphasis that is now being placed on small fast reactors, the most productive line of research is the determination of activation cross sections and capture spectra for a fission spectrum of neutrons. The availability of 14 Mev neutrons from inexpensive pulsed sources makes determinations at this energy quite attractive. High energy neutron interactions with heavy elements can result in a number of processes not possible with lower energy neutrons; consequently, research in this area should be productive. (Author)

AD-294 612 Div. 20
(TISTP/JW) OTS price $3.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
RADIATIVE TRANSITION PROBABILITIES AND ABSORPTION OSCILLATOR STRENGTHS FOR THE ALKALI-LIKE IONS OF THE ALKALINE EARTHS AND FOR CALCIUM I,
by T. G. Roberts and W. L. Hales. 23 Oct 62, 39p. incl. tables, 24 refs. (Rept. no. RR-TR-62-8)
Unclassified report

DESCRIPTORS: *Radiation effects, *Alkaline earths, Oscillation, Calcium, Beryllium, Magnesium, Strontium, Cesium, Barium, Transition elements, Absorption.

The radiative transition probabilities and absorption oscillator strengths for the alkali-like ions of the alkaline earths have been calculated by using the central field approximation of Bates and Damgaard. The radiative transition probabilities and f values were also calculated for Calcium I. The calculated f values for Calcium I are compared with the experimental f values which were measured by Ostrovskii and Penkin, and by Olsen, Routly, and King. This comparison showed that, even for complex atomic systems, the central field approximation of Bates and Damgaard yields reasonably accurate relative transition probabilities and relative f values. The transition probabilities and f values which were calculated for cesium by Heavens using the method of Bates and Damgaard and by Stone using a different method are compared with each other and with the few existing experimental f values for Cesium I. (Author)

AD-294 640 Div. 20, 2
(TISTP/JW) OTS price $6.60

Isotopes Inc., Westwood, N. J.
PROJECT STAR DUST.
Quarterly rept. no. 3, Oct-Dec 61,
by James P. Friend, Herbert W. Feely and others.
1 Feb 62, 65p. incl. illus. tables, 12 refs.
(Contract DA 49-146-XZ-079)
(DASA 1303) Unclassified report

DESCRIPTORS: *Radioactive fallout, *Atmospherics, Stratosphere, Sampling, Radiation effects, Scattering, Beryllium, Strontium, Rhodium, Tungsten, Measurement, Meteorological data.

Meteorological study of atmospheric mixing and transfer processes has continued and progress was made on the development of the Star Dust model of atmospheric mixing and transfer. Data on the stratospheric distribution of tungsten-185 are being used as the first test of the accuracy of the meteorological parameters adopted. Star Dust filter sampling of stratospheric air has continued and, since 30 September 1962, debris from the 1961 Soviet test series has been encountered in the Star Dust sampling corridor. The analytical program has been modified to gain as much information as possible about this Soviet debris, because it constitutes an additional ''tracer'' for stratospheric meteorology. It was all injected, originally, into the northern polar stratosphere during the reasonably short intervals, 1 September - 4 November 1961, and its southward spread into the troposphere has been observable virtually unhindered by the presence of debris from previous tests. The debris which was present in the stratosphere before the 1961 Soviet tests began was quite old and, for the most part, easily distinguishable from the Soviet debris. It has been especially illuminating to compare the characteristics of the southward movement of the Soviet debris with the characteristics of the northward movement of tungsten-185 observed during the High Altitude Sampling Program. (Author)

AD-294 641 Div. 20, 2
(TISTP/JW) OTS price $6.60

Isotopes, Inc., Westwood, N. J.
PROJECT STAR DUST.
Quarterly rept. no. 4,
by James P. Friend and Herbert W. Feely.
1 May 62, 68p. incl. illus. tables, 19 refs.
(Contract DA 49-146-xz-079)
(DASA 1304) Unclassified report

DESCRIPTORS: *Stratosphere, *Radiation effects, Tungsten, Rhodium, Analysis, Filter papers, Sampling, Nuclear forces, Measurement.

Project Star Dust has as its aim the construction of a model of stratospheric mixing and transport. Data from the high altitude sampling program and other studies of worldwide fallout are being used in constructing the model, but to obtain additional data a program of filter sampling of stratospheric radioactivity is also being carried out. (Author)

AD-294 642 Div. 20, 2
(TISTP/JW) OTS price $8.10

Isotopes, Inc., Westwood, N. J.
PROJECT STAR DUST.
Quarterly rept. no. 2, June-Sep 61,
by James P. Friend and Herbert W. Feely.
1 Nov 61, 86p. incl. illus. tables, 16 refs.
(Contract DA 49-146-xz-079)
(DASA 1302) Unclassified report

DESCRIPTORS: *Stratosphere, *Radiation effects, Tungsten, Rhodium, Analysis, Filter papers, Sampling, Nuclear forces, Measurement.

As part of Project Star Dust, a series of filter samples of stratospheric air has been collected since June 1961 and was analyzed for a few long-lived fission products, for the 'tracers' tungsten-181 and rhodium-102, and for a few naturally occurring radionuclides. The results of these analyses are presented and the significance of the data is discussed. Only the samples collected during the period June 1961-September 1961 are discussed in detail, but preliminary data are given also for samples for samples collected during October 1961 when debris from the 1961 Soviet tests was passing through the sampling corridor. (Author)

AD-294 651 Div. 20, 25
(TISTP/TL) OTS price $1.10

Ecole Normale Superieure (France).
SOME REMARKS ABOUT GAUGE INVARIANCE IN THE ISOBARIC MODEL FOR PHOTOPRODUCTION,
by M. Gourdin and Ph. Salin. Oct 62, 6p. 4 refs.
(Technical note no. 6)
(Grant AF EOAR 63-47)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Nuclear isobars, *Particles, *Nuclear models, *Nucleons, *Pions, Mesons, Photons, Transformation (Mathematics), Partial differential equations, Nuclear moments, Nuclear magnetic resonance, Couplings, Photonuclear reactions, Electromagnetic fields, Tensor analysis.

The object of this analysis is to give a gauge invariant formalism for both spin J equals 3/2 plus and J equals 3/2 minum isobar terms corresponding to Pi-nucleon resonances. (Author)

21. NUCLEAR PROPULSION

AD-294 300 Div. 21, 12
(TISTM/SJR) OTS price $8.60

Airesearch Mfg. Co., Phoenix, Ariz.
SPUR POWER SYSTEM.
Quarterly progress rept., 1 July-30 Sep 62,
by F. B. Wallace. 15 Oct 62, 189p. incl. illus. tables (Rept. no. SY-5396-R2)
(Contract AF 33(657)8954, Proj. 3145)
Unclassified report

DESCRIPTORS: *Nuclear propulsion, *Spaceships, Creep, Rupture, Molybdenum alloys, Niobium alloys, Titanium alloys, Zirconium alloys, Potassium, Liquid metal cooled reactors, Heat exchangers, Stainless steel, Heat resistant alloys, Turbines, Generators, Test equipment, Reactor control, Pumps, Thermal utilization, Erosion, Design.

Major technica work areas are as follows: Materials testing, including creep rupture and fatigue evaluation of Mo + 1/2 w/o Ti and Cb + 1 w/o Zr. Methods for joining refractory metals in heat exchangers and in the radiator. Liquid potassium bearing tests and analysis. Turbine performance test rig design. Turbine material erosion tests. Design and fabricate a 50-kw, liquid metal cooled, model generator. Boiling potassium heat-transfer tests. Study of flow stability and heat-transfer flow processes, including development tests on a separator. Design of stainless steel heat-transfer components and a heat-transfer test loop. Steady-state and load-change control analysis and a start-up control analysis and simulation test. Reactor loop pump analysis and bearing test, and loop dynamic simulation. Reactor loop control analog simulation. (Author)

22. ORDNANCE

AD-293 846 Div. 22, 6
(TISTW/PCR) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
CHARACTERIZATION OF SQUIB MK 1 MOD 0; SENSITIVITY TO 9KMC RADAR PULSES,
by I. Kabik and C. Goode. 31 Aug 62, 1v. incl. illus. tables, 17 refs. (NOLTR 62-77)
Unclassified report

DESCRIPTORS: *Electric detonators, *Electric igniters, *Radar pulses, Waveguides, Radar equipment, Tests, Test methods, Ignition, Detonation, Temperature, Simulation, Attenuation, High frequency, Radiofrequency attenuators, Radar signals, Test equipment, Sensitivity.

Mk 1 Mod 0 Squibs were fired in the wave guide of a 9kmc radar. For fully loaded squibs, on the basis of previous tests at dc to 5 megacycles, the bridgewire in the 9kmc tests did not reach the temperature expected necessary for firing. Squibs without cup or base charge approximated the expected firing temperature. From the results it is inferred that squib simulators used to predict firing on the basis of bridgewire temperature may not be applicable at frequencies as high as 9kmc. It is also hypothesized that the powder charges in some devices may act as attenuators somewhat reducing the probability of firing in high frequency rf fields. (Author)

AD-293 871 Div. 22
(TISTB/DGH) OTS price $1.60

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
THE EXPOSURE OF GUINEA PIGS TO PRESSURE-PULSES GENERATED DURING THE END-TO-END TEST (NO. 2) OF ATLAS MISSILE 8-D (MARCH 31, 1962).
Technical progress rept.,
by D. R. Richmond. 26 June 62, 29p. incl. illus. tables, 5 refs.
(Contract DA 49-146-XZ-055)
(DASA 1313) Unclassified report

DESCRIPTORS: *Blast, Explosions, Guided missiles, Pressure, Control systems, Effectiveness, Laboratory animals, Hazards.

To help determine the extent of the blast hazard to the operator of a pressure control unit, an Atlas 8-D missile was pressurized to 35 psi with

gaseous nitrogen and ruptured with an explosive charge. Three guinea pigs were placed on the pressure control unit which was located beneath the ramp 90 ft from the missile. In addition, ten guinea pigs were placed on the surface of the simulated ramp at 30-, 35-, 75- and 94-ft ranges. Following the burst, missile fragments littered the test area, although none were found at the pressure control unit. Overpressures of only 0.3 psi were recorded in the vicinity of the pressure control unit. The pressure pulse was slow rising (9-14 msec) and endured for about 25 msec. The three guinea pigs at that location were unharmed. At the 30-ft ranges, pressures of 1.1-1.4 psi were recorded with times to peak and durations of 2-3 msec and 13-16 msec, respectively. One guinea pig's eardrum was ruptured, and one animal sustained a slight degree of lung hemorrhage. The other eight animals were unhurt. The biological results were discussed in relation to the pressure-time data. (Author)

AD-293 875 Div. 22
(TISTB/DGH) OTS price $3.60

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
A TENTATIVE ESTIMATION OF MAN'S TOLERANCE TO OVERPRESSURES FROM AIR BLAST.
Technical progress rept.,
by Donald R. Richmond and Clayton S. White
7 Nov 62, 51p. incl. illus. tables, 30 refs.
(Contract DA 49-146-XZ-055)
(DASA 1335) Unclassified report

DESCRIPTORS: *Air blast, Pathology, Physiology, Pressure, Blast, Effectiveness, Survival, Hazards.

Tentative estimates of the sharp-rising overpressures as a function of duration which represent a lethal hazard to the 70-kg animal 1, 50 and 99 per cent of the time were presented. The predictions were based on interspecies correlations and extrapolations encompassing blast-tolerance data for six mammalian species. The tentative application of the data to indicate human blast tolerance was discussed and relevant uncertainties in the estimates were emphasized. It was also pointed out that biologic tolerance would be different for air-blast pulses having non-ideal wave forms frequently associated with various geometries of exposure. Selected pathophysiological information pertinent to the biological response following blast exposure was given; namely survival time and selected post-shot observations of dogs and goats. (Author)

AD-293 988 Div. 22
(TISTW/JEA) OTS price $1.60

Aerojet-General Corp., Downey, Calif.
PULSE-SENSITIVE ELECTROEXPLOSIVE DEVICES.
Monthly progress rept. no. 5 for Nov 62,
by H. M. Kenworthy. 8 Jan 63, 14p. incl. illus. 1 ref. (Rept. no. 0689-01(05)MP)
(Contract N178-8107)
Unclassified report

DESCRIPTORS: *Explosive actuators, *Electric bridges, *Metal films, Electric detonators, Ceramic materials, Electrometers, Resistance, Glass electrodes, Thermal conductivity, Thin films, Beryllium compounds, Oxides, Aluminum, Oscilloscope probes, Design, Pulse transformers, Heat transfer.

Research is presented on the behavior of a metallic film when it is electrically heated and is in physical contact with a heat sink. The objective of the research is to study the variable parameters and to develop a manufacturing process or processes for applying a bridge heating element to a ceramic surface with the required thermal contact. (Author)

AD-294 011 Div. 22, 15
(TISTW/JEA) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
EXTRAPOLATION TECHNIQUES OF KILL PROBABILITY DATA,
by Moyle Braithwaite. Nov 62, 16p. incl. illus.
(NOTS Technical publication no. 3087)
(WEPTASK RMMO042-004/216-1/F008-08-006)
Unclassified report

DESCRIPTORS: *Fragmentation ammunition, *Probability, *Bomb clusters, Explosions, Information theory, Mathematical prediction, Integral equations, Mathematical logic, Ammunition fragments, Interception probabilities, Measure theory.

A simple formula is described that can be used to extrapolate the kill probability data with a reasonable degree of accuracy. There are limitations in using the formula, however; and since the formula has an empirical origin, its limitations are discussed at length with the aid of some theory, several graphs, and some numerical examples. (Author)

AD-294 105 Div. 22, 2, 6
(TISTW/PCR) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
MEASUREMENTS OF COUPLING BETWEEN COLUMNS OF EXPLOSIVE AND ARTIFICIAL ROCKS,
by Charles J. Haas and John S. Rinehart. Nov 62, 38p. incl. illus. tables (Rept. no. NOTS TP 3058)
(NAVWEPS rept. no. 8055)
Unclassified report

DESCRIPTORS: *Explosives, *Shock waves, High speed photography, Velocity, Correlation techniques, Density, Tensile properties, Shear stresses, Compression shock, Porosity, Physical properties, Tests, Test methods, Experimental data, Couplings, Earth.

An attempt has been made to measure the coupling between an explosive and a material by using the pellet technique, and some results have been obtained. This technique gives a measure of one parameter of coupling, the momentum in a portion of the shock wave corresponding to twice the thickness of the pellet. Pellets made from the specimen materials were placed on a flat surface inclined with the axis of the specimen such that the shock wave generated by the explosion would strike the surface at normal incidence. The ovement of the pellets was photographed with Fastax movie camera and their velocities determined. The pellet technique appears to give a good measure of the momentum in the shock wave. Long pellets seem to behave more favorably than short ones of the same diameter. The best correlation was found between the momenta of the pellets and both the quantities rho c and rho c squared where rho is the mass density and c the dilatational wave velocity of the material. Momentum was found to increase with increasing rho c and with increasing rho c squared. In these tests no correlations exist between the momentum and the tensile strength, between the momentum and the shearing strength, and between the momentum and the compressive strength. The test results show a marked decrease in momentum for an increase in porosity. (Author)

AD-294 184 Div. 22, 14
(TISTW/PCR) OTS price $1.10

Army Armor Board, Fort Knox, Ky.
EVALUATION OF ROADWHEELS WITH SPRAY-ON WEAR SURFACES FOR M60A1 TANKS.
Report on USATECOM.
8 Jan 63, 6p. incl. illus.
(Proj. no. 1F-3216-31)
Unclassified report

DESCRIPTORS: *Roadwheels, *Tanks, Tests, Test methods, Surfaces, Sprays, Aluminum, Installation, Mobile, Maintenance, Reliability.

Standard aluminum road wheels for M60 or M60A1 tanks with the steel wear plates replaced by a newly developed spray-on wear surface were evaluated. This process provides a metallized wear ring around the surface of the wheel that makes contact with the steel center guides of the track. The wheels were examined for physical characteristics, installation, mobility, maintenance, durability and reliability. It was determined that the test item was unsuitable for use on M60 series tanks because it did not meet the durability requirement of 2,500 miles.

AD-294 304 Div. 22
(TISTW/PCR) OTS price $1.10

Little, Arthur D., Inc., Cambridge, Mass.
SENSITIVITY OF CASED EXPLOSIVE MATERIALS TO IMPACT BY REGULAR FRAGMENTS.
Monthly progress rept. no. 7, 31 Aug-28 Sep 62.
28 Sep 62, 4p. tables.
(Contract DA 19-020-ORD-5617)
Unclassified report

DESCRIPTORS: *Explosives, *Cartridge cases, Tests, Test methods, Velocity, Projectile cases, Storage, Propellants, Detonation, Thickness, Calibration, Tables, Sensitivity, Impact shock, Fragmentation.

The program is designed to aid in determining a more realistic quantity distance relationship for the storage of Ordnance explosive material. It is the intent of this project, through an experimental program, to establish a limiting fragment mass vs impact velocity relationship for the detonation of certain explosives and/or propellants enclosed in casings of different thicknesses. This report discusses the firing of 0.2 oz fragments for velocity calibration and assessment of fragment damage. Receiver charge detonability tests were also fired. No detonations were recorded. (Author)

AD-294 484 Div. 22
(TISTW/PCR) OTS price $3.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
STRESS ANALYSIS OF THE HOLLOW BASE SECTION OF ARTILLERY PROJECTILES,
by Alfred F. Mardarello. Jan 63, 29p. incl. illus. 10 refs. (Technical memo. no. 1106)
Unclassified report

DESCRIPTORS: *Projectiles, Mathematical analysis, Equations, Guns, Gun barrel attachments, Pressure, Geometry, Stresses.

A method for stress analysis of the hollow boattail base portion of an artillery shell is presented. The analysis is presented in two parts: maximum stresses at the muzzle and maximum stresses in the gun. Each case is examined in terms of projectile geometry and gun pressure. Derivations or references are included for the equations. (Author)

AD-294 747 Div. 22
(TISTW/PCR) OTS price $3.60

General Electric Co., Burlington, Vt.
PROJECT VULCAN RESEARCH AND DEVELOPMENT.
Progress rept. no. 37, 1 Oct-30 Nov 62.
31 Dec 62, 36p. incl. illus. (Rept. no. 63APB3)
(Contract DA 19-020-ORD-5455)
Unclassified report

DESCRIPTORS: *Aircraft guns, *Automatic weapons, Design, Tests, Boresighting, Cams, Lubrication, Guns, Solenoids, Photographs.

The following projects and studies are described: (1) Improved Parts Life: spiral pin, cycloidal cam, foreward cam corners, bolt body, bolt roller shafts. (2) Boreshighting and Target Study: projection gun data. (3) Gun Components: universal guide bar, clearing cam solenoid modification, clearing sector spring, lubricator for B-58. (4) Range Firing Records. (Author)

AD-294 752 Div. 22, 12
(TISTP/JW) OTS price $11.50

North Carolina State Coll. School of Physical Sciences and Applied Mathematics, Raleigh.
STUDY OF THE GUN-BOOSTED ROCKET SYSTEM.
Summary rept. for June 52-Aug 62,
by Walter J. Harrington and Roberts C. Bullock.
15 Dec 62, 155p. incl. illus. tables, refs.
(Contract nos. DA 01-009-ORD-1022, Proj. 5W17-01-002, DA 01-021-ORD-3190 and others)
Unclassified report

DESCRIPTORS: *Artillery rockets, Spin stabilized ammunition, Fin stabilized ammunition, Gun launched, Dynamics, Equations, Gravity, Scattering.

Results of studies relative to sources of dispersion of artillery-type rockets are summarized. Mathematical equations and formulas which are applicable to the analysis of the effects of various dispersion-producing factors on both spin-stabilized and fin-stabilized gun-boosted rockets are presented, and their uses are illustrated by numerical examples. Experimental techniques are described and some results are given. Implications of mathematical results relative to rocket design are discussed. A mathematical model for studying effect of launcher tube motion is given. (Author)

23. PERSONNEL AND TRAINING

AD-294 477 Div. 23
(TISTB/DGH) OTS price $2.60

Occupational Research Center, Purdue U., Lafayette, Ind.
THE EXPERIMENTAL USE OF VARIOUS TYPES OF SCALES IN RATING JOB ACTIVITIES,
by David L. Peters and Ernest J. McCormick.
Nov 62, 21p. incl. tables, 10 refs.
(Contract Nonr-110019)
Unclassified report

DESCRIPTORS: *Job analysis, Theory, Measurement, Reliability, Effectiveness.

The results of the study support the following conclusions: (1) Job tasks and job titles were scaled on five worker-activity dimensions with reasonable reliability. (The reliability

coefficients of the mean ratings of from 9 to 14 raters ranged from .90 to .98.) (2) In the context of this study, there were no systematic differences in the reliability with which job titles versus job tasks were scaled on the worker-activity dimensions. (3) Job tasks generally were rated with greater reliability when judges used a scale that consisted of seven previously-scaled job tasks that had been selected as benchmarks for the scale than when they used a simple seven-point numerical scale. (Author)

AD-294 549 Div. 23
(TISTB/MS) OTS price $5.60

Bureau of Naval Personnel, Washington, D. C.
TRAINING, UTILIZATION AND PROFICIENCY OF NAVY ELECTRONICS TECHNICIANS. II. TECHNICAL EXPERIENCE AND PROFICIENCY,
by Adolph V. Anderson. Sep 62, 54p. incl. illus. tables, 1 ref. (Technical bulletin no. 62-13)
Unclassified report

DESCRIPTORS: *Training, *Electronics, Tests, Effectiveness, Maintenance personnel, Naval personnel.

This second of a seven-report series based on the results of a major survey of the training, utilization, and proficiency of Navy Electronics Technicians (ET's) was conducted in the Pacific Fleet and the western United States during the first half of 1961. This report is based primarily on an analysis of two check lists used in the survey: the Equipment Experience Check List and the Performance Check List. The major use of this report is intended for school administrators. Tables 1 and 2 furnish information about the proportions of ET's who work on specific equipments. The major table in the report provides information on both the experiences ET's have had with 292 specific tasks and their proficiency on these tasks. Additional findings of interest were that ET's indicated maintenance experience on a total of 242 separate equipments, considerable specialization, especially at lower pay grades, on either communications or radar gear exists, proficiency increases with age and pay grade, proficiency as measured by derived check list scores is significantly related to proficiency indicated by supervisors' ratings, proficiency was not related to either technical school grades, years of education, or classification test scores. (Author)

AD-294 550 Div. 23
(TISTB/MS) OTS price $3.60

Bureau of Naval Personnel, Washington, D. C.
TRAINING, UTILIZATION AND PROFICIENCY OF NAVY ELECTRONICS TECHNICIANS. III. PROFICIENCY IN THE USE OF TEST EQUIPMENT,
by Adolph V. Anderson. Sep 62, 31p. incl. tables, 2 refs. (Technical bulletin no. 62-14)
Unclassified report

DESCRIPTORS: *Training, *Electronics, Effectiveness, Tests, Test equipment, Maintenance personnel, Naval personnel.

In order to sample proficiency in the use of electronic test instruments, a test on the use of four common pieces of portable test equipment was developed and included in the ET survey. This report is devoted to the test equipment test and the data resulting from its administration. Findings of particular interest are: (a) complete mastery was not demonstrated for any test equipment by any rate group in the two samples; (b) in general, proficiency in use of test instruments increases with rate to the second class petty officer level but very little beyond that level; (c) for the non-electronic multimeter (VOM) most difficulty was experienced in the measurement of current and an ac voltage which was superimposed on dc. Failure to use the function switch properly caused most errors in the latter reading; (d) few ET's of any rate were able to calibrate properly the AN/URM-25 RF Signal Generator Set; (e) in use of the oscilloscope ET's found display of waveforms easiest, measurement of duration more difficult, and measurement of amplitude most difficult with only about 10% of the total samples being able to make amplitude measurements correctly; (f) performance on the test equipment test was found to be positively and substantially related to derived check list scores and to supervisors' ratings of overall proficiency. (Author)

AD-294 814 Div. 23
(TISTB/DGH) OTS price $1.60

Illinois U., Urbana.
HIERARCHICAL FACTORS IN COURSE GRADES IN AN AVIATION HIGH SCHOOL,
by Lloyd G. Humphreys. Oct 62, 10p. incl. tables.
(Contract AF 41(657)279, Proj. 7719)
(PRL TDR 62-23)
Unclassified report

DESCRIPTORS: *Education, Students, Factor analysis, Analysis of variance, Achievement tests, Air force.

Factor scores of high school grades were needed for use in a later study of the relationship of Air Force aptitude tests in high school achievement. Separate hierarchical analyses were made for course grades in the technical curriculum and in the mechanical curriculum. A large general factor characterized both solutions, probably reflecting general academic ability. Other factors displayed the expected subject-matter groupings, the most significant a clear-cut shop factor which appeared in both analyses. (Author)

AD-294 848 Div. 23
(TISTB/DGH) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
A TECHNIQUE FOR THE EVALUATION OF RECRUITING STRATEGY WITH FLUCTUATING AVAILABILITY AND KNOWN DEMAND,
by Frank B. Ford. Sep 62, 17p. incl. illus. tables, 2 refs. (Rept. no. PRL TDR 62-22)
(AF Proj. 7719)
Unclassified report

DESCRIPTORS: *Recruiting, *Personnel, Military personnel, Abundance, Costs, Statistical functions, Linear programming, Mathematical computer data, Theory.

Large organizations, such as the armed services, have a fairly constant requirement for new personnel, but availability of recruits varies from month to month. It is proposed that manpower needs be met by exceeding quotas at times of high availability of qualified applicants and holding surpluses inactive until needed. A special case of the general linear programming model, the transportation problem, provides a computer technique for determining the optimal scheduling of overages and holding times to keep holding costs at a minimum. Different arbitrary estimates of holding costs applied to a series of problems demonstrate the importance of accurate cost estimates. Procedures for continuing improvement of input data are suggested. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-294 778 Div. 24
(TISTM/EJH) OTS price $6.60

Itek Corp., Waltham, Mass.
STUDY OF IMAGE-EVALUATION TECHNIQUES.
Interim engineering rept. no. 2, 11 Oct 62-15 Jan 63,
by G. C. Brock, W. L. Attaya and others.
15 Jan 63, 65p. incl. illus. tables, 6 refs.
(Rept. no. Itek 9048-2)
(Contract AF 33(657)9158)
Unclassified report

DESCRIPTORS: *Aerial photography, *Aerial reconnaissance, Aerial photographs, Photographic film, Photographic analysis, Photographic emulsions, Aerial cameras, Interferometers, Test equipment, Simulation, Photographic equipment.

Divisions of the work described include: a precision camera and associated equipment for simulated aerial photography, further work on emulsion threshold modulations and their use in predicting system resolving power, a study of the possibilities of interferometer techniques for exposing sinusoidal patterns onto emulsions at frequencies up to 750 lines per millimeter, and experimentation with coherent light techniques for exposing sinusoidal patterns onto emulsions and analyzing the exposed patterns. The modulation transfer function of Kodak Tri-X film has been determined by the coherent light method out to 110 lines per millimeter. The results agree with the published figures, within a few percent, above 20 lines per millimeter. (Author)

25. PHYSICS

AD-293 825 Div. 25, 8
(TISTP/WH) OTS price $1.10

Martin-Marietta Corp., Denver, Colo.
BIBLIOGRAPHY ON ELECTRICAL IONIZATION OF GASES, SEPTEMBER 1958-1960 (SUPPLEMENT).
Jan 61, 5p. refs. (Literature search no. 12)
Unclassified report

DESCRIPTORS: *Bibliography, *Electric discharges, *Ionization, *Plasma physics,.

AD-293 835 Div. 25
(TISTM/ODN) OTS price $1.10

Army Materials Research Agency, Watertown, Mass.
LOCALIZED MAGNETIC MOMENTS IN METALS,
by A. J. Freeman. Nov 62, 6p. (Rept. no. 125)
(DA Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Metals, *Magnetic moments, Nuclear magnetic resonance, Atoms, Palladium alloys, Theory, Spin, Rhodium alloys, Alloys, Molybdenum alloys, Iron, Magnetic properties.

A simple model is used to obtain information about localized magnetic moments in metals from Mossbauer (or nuclear magnetic resonance) experiments. The formulation emphasizes the explicit dependence of the hyperfine field on the spin S' of the Fe atom and shows why the temperature dependence of the hyperfine field follows a Brillouin function of the total localized spin S (with S does not equal S'). The moment of Fe atoms in dilute concentrations of Pd, Rh, and Mo are determined and the apparent contradiction between Mossbauer and susceptibility measurements for Rh and Mo is discussed. (Author)

AD-293 842 Div. 25, 15
(TISTM/JEA) OTS price $13.00

Air Force Cambridge Research Labs., Bedford, Mass.
TABLES OF THE BLACKBODY RADIATION FUNCTION FOR WAVENUMBER CALCULATIONS.
Research rept.,
by Russell G. Walker. Sep 62, 178p. incl. tables (Rept. no. AFCRL-62-877)
(Proj. 4904)
Unclassified report

DESCRIPTORS: *Blackbody radiation, Frequency, Physical properties, Temperature, Range, Physics, Wave analysis, Tables.

Tables of the Planck Radiation function are presented in terms of the spectral radiance (watts/sq. cm ster/cm) of a blackbody as a function of the wavenumber of the radiation. Values of the spectral radiance are tabulated for the temperature range 77 K to 30,000 K over the wavenumber range 50 to 37500/cm. (Author)

AD-293 844 Div. 25, 13, 15
(TISTP/JW) OTS price $5.60

Air Force Cambridge Research Labs., Bedford, Mass.
CAUSALITY, PHYSICAL REALIZABILITY, AND STABILITY.
Research rept.,
by E. J. Post. Oct 62, 47p. incl. illus. table, refs. (Rept. no. AFCRL-62-779)
(Proj. 5635)
Unclassified report

DESCRIPTORS: *Integral transformers, *Electrical networks, *Fourier analysis, Analysis, Stability, Mathematics.

Conceptual similarities and differences between causality, physical realizability, and stability are discussed in an effort to coordinate some parallel and relevant developments in physics, engineering, and mathematics. The concept of causality emerges as the most fundamental of the three. Special attention was given to limiting cases of lossless or almost lossless systems. Mathematical singularities arising in these limiting cases are treated in terms of the theory of generalized functions and regular sequences. The phase-gain description of systems was modified to match the symmetry and uniqueness of the more customary 'immittance' description. (Author)

AD-293 848 Div. 25
(TISTM/ODN) OTS price $1.10

Clarendon Lab., U. of Oxford (Gt. Brit.).
PARAMAGNETIC RESONANCE SPECTRUM OF DIVALENT IRON IN ZINC FLUOSILICATE,
by R. S. Rubins. Feb 62, 6p. 5 refs. (Technical (Scientific) note no. 10)
(Contract AF 61(052)125)
(AFCRL 62-930) Unclassified report

DESCRIPTORS: *Zinc compounds, *Fluorides, *Silicates, *Iron, *Paramagnetic resonance, Absorption, Crystals, Ions, Single crystals, Magnetic susceptibility, Spin.

An anisotropic absorption edge observed at low temperatures in the e.s.r. spectrum of Fe(tt) in zinc fluosilicate is attributed to a forbidden (delta M = 2) transition within an excited doublet. The measured value, g = 2.38, is interpreted in terms of a trigonal crystalline field component some four times smaller than that deduced from susceptibility measurements on the undilute ferrous salt. Confirmation is obtained from measurements made in the perpendicular plane where the doublet is split by a second-order Zeeman effect. The results of experiments on mixed Fe-Zn crystals point tentatively to a gradual variation of trigonal field strength with Fe(tt) concentration. (Author)

AD-293 859 Div. 25
(TISTP/WH) OTS price $3.60

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
THE EQUATIONS OF CONSERVATION FOR MULTICOMPONENT REACTING GAS FLOWS,
by Fred E. C. Culick. Sep 62, 26p. 10 refs.
(Technical rept. no. 48)
(Contract AF 49(638)245)
Unclassified report

DESCRIPTORS: *Kinetic theory, *Gas flow, *Continuum mechanics, *Molecules, Chemical reactions, Motion.

The derivation of the conservation equations for multicomponent gas flows is discussed briefly from the point of view of classical kinetic theory and in somewhat greater detail within the principles of continuum theory. The chief objective is to clarify certain points regarding the diffusion stress tensor which has been introduced elsewhere. (Author)

AD-293 874 Div. 25
(TISTM/SJR) OTS price $3.60

Duke U., Durham, N. C.
SPECIFIC HEAT OF ALUMINUM NEAR ITS SUPERCONDUC-

TIVE TRANSITION POINT,
by David C. Rorer, Horst Meyer, and Robert C. Richardson. 1 Dec 62, 1v. incl. illus. tables, 28 refs. (Technical rept. no. 1)
(Contract Nonr-118112, Proj. NR 018-904)
Unclassified report

DESCRIPTORS: *Aluminum, *Superconductivity, *Transition temperature, Test equipment, Vapor pressure, Helium, Single crystals, Specific heat, Low temperature research, Calorimeters.

We have carried out specific heat measurements with a high temperature-resolution in different magnetic fields on three specimens of aluminum. These measurements gave the difference of the specific heat between the superconductive and the normal state, the latent heat and the critical field curve. For a reversible transition, these three quantities are related by thermodynamic equations and hence it is possible to check their consistency. For one sample, this consistency was within experimental error; for the two other samples, there was some disagreement between the critical curve as measured and as calculated. The shape of the transition in zero field has been investigated in detail and it was found that the phase change could take place within about 6/10,000 K for one sample, while for the two others it was spread over two millidegrees. From the width we have estimated the correlation range using Pippards theory. (Author)

AD-293 885 Div. 25, 4
(TISTM/RGR) OTS price $10.10

General Dynamics/Fort Worth, Tex.
ENERGY STORAGE MECHANISMS IN LIQUID HYDROGEN,
by H. G. Carter. 31 Oct 62, 134p. incl. illus. tables, 52 refs. (Document no. NARF-62-15T; FZK-9-180)
(Contract AF 33(657)7201)
Unclassified report

DESCRIPTORS: *Hydrogen, *Energy, Radiation effects, Dissociation, Thermal radiation, Infrared radiation, Low temperature research, Chemical reactions, Chemical bonds, Cryogenics, Liquefied gases, Storage.

Energy-storing products of irradiated liquid hydrogen are examined from the point of view that the expulsion of potential energy in the form of such products may lead to lower design weights for nuclear rockets. It is found that a significant fraction of the energy deposited by radiation in liquid hydrogen is stored temporarily through the dissociation and excitation of H2 molecules. Experimental and theoretical results are consistent with a rate of dissipation of such energy into thermal motion which is much slower than the rate at which the radiation products are expelled from the tank. It is concluded that, insofar as radiation heating of the propellant is a significant design factor, further consideration should be given to radiation-induced reactions in liquid hydrogen and that any radiation-heating experiments should be interpreted in terms of possible energy-storage effects. (Author)

AD-293 909 Div. 25
(TISTM/EJH) OTS price $1.60

Illinois U., Urbana.
CYCLOTRON RESONANCE IN AgBr,
by G. Ascarelli and Frederick C. Brown. July 62, 12p. incl. illus. table, 14 refs. (Technical note no. 3)
(Grant AF62-215)
Unclassified report

DESCRIPTORS: *Silver compounds, *Bromides, *Electrons, *Quantum mechanics, Crystals, Resonance, Microwave spectroscopy, Cyclotrons, Nuclear spins.

It can be seen that for f = 69.9 kmc the observed resonance at H = 6.6 kilo-orsted corresponds to a polaron mass m*/m sub e = 0.27 in good agreement with the recent theory of Feynman et al. Although the agreement may be partly fortuitous, it seems to argue for the Froehlich model and approximations used by these authors, at least for small coupling constants. The theoretical mobility versus effective mass curve is such that a 10% error in the experimental mobility gives rise to an uncertainity of about 6% in m/m sub e. From the numbers it appears that the Low-Pines theory can be brought into closer agreement by improving the approximation m*/m = 1 + alpha/6. (Author)

AD-293 940 Div. 25
(TISTP/TL) OTS price $10.10

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
TOPICS IN OPTIMIZATION THEORY.
Final rept.,
by Henry J. Kelley, H. Gardner Moyer and others. June 62, 118p. incl. illus. 28 refs. (Rept. no. RE-159)
(Contract AF 29(600)2733)
Unclassified report

DESCRIPTORS: *Particle trajectories, *Quantum mechanics, *Control systems, *Differential equations, Rocket propulsion, Solar sails, Flight, Thrust, Integration, Calculus of variations, Partial differential equations, Oscillation, Tests, Numerical analysis, Theory, Vector analysis, Acceleration.

Practical trajectory optimization problems are usually so complex as to require numerical rather than analytical approaches to solution. Consequently, it was necessary to grant first priority and a great deal of effort to means for computing optimal trajectories which satisfy prescribed boundary conditions. This was pursued primarily along the lines of the indirect method, the inference of a solution from the first three conditions of the classical theory, and by direct methods, mainly successive approximations. Relatively little was done in applying the necessary conditions associated with the second variation or in determining the characteristics of families of optimal trajectories, or fields of extremals, to employ variational terminology. These matters are of interest not only in ensuring selection of a truly optimal trajectory for operational use but are of primary interest in connection with the problem of guidance. A number of loosely connected studies in this general area is presented. (Author)

AD-293 998 Div. 25, 9
(TISTP/JW) OTS price $2.60

New Hampshire U., Durham.
INTERACTION BETWEEN COLD PLASMAS AND GUIDED ELECTROMAGNETIC WAVES. II.
by Lyman Mower and S. J. Buchsbaum. 1962, 26p. illus. 6 refs.
(Grant no. 62-105; In cooperation with Mass. Inst. of Tech. and Bell Telephone Labs., Murray Hill, N. J.)
(AFOSR-2771) Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, Magnetic fields, Fluid flow, Density, Resonance, Cylindrical bodies, Conductivity, Perturbation theory, Microwaves.

The interaction between cylindrically symmetric anisotropic plasma column and bounded electromagnetic waves is analyzed theoretically. The properties of a cylindrical cavity coaxial with a cold plasma column and a coaxial with a static magnetic field are determined. The shift in the resonant frequency of the cavity-plasma system is calculated in the high electron density limit and compared with the numerical solution presented earlier. (Author)

AD-294 007 Div. 25
(TISTM/EJH) OTS price $3.60

Louvain U. (Belgium).
PHOTO-HALL STUDY ON A SINGLE CRYSTAL OF CdS.
Rept. for Mar-Sep 62,
by Francis Leprince and Jean-Marie Streydio.
5 Nov 62, 24p. incl. illus. tables (Technical note no. 4)
(Contract AF 61(052)166)
(RADC TDR 62-628) Unclassified report

DESCRIPTORS: *Cadmium compounds, *Sulfides, *Single crystals, *Hall effect, *Photoconductivity, Photoelectric materials, Semiconductors, Optics, Conductivity, Absorption, Infrared radiation, Radiation effects.

Contents:
Electronic and optical properties of CdS
Procedure
  Crystal stabilization
Results
  Hall effect
  Conductivity
Discussion
  Hall effect appellation (surface effects, contact effects, galvano-and thermomagnetic effects)
  Quenching effect on Hall mobility
    P and N conduction
  Influence of Tesla discharges
  Difference between longitudinal and transversal mobilities
  Increase of mobility during experiments

AD-294 008 Div. 25, 8
(TISTP/JW) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADIO-ECHO STUDIES OF THE MOON AT 7.84-METER WAVELENGTH,
by J. V. Evans and R. P. Ingalls. 20 Nov 62, 28p. incl. illus. tables, 23 refs. (Technical rept. no. 288)
(Contract AF 19(628)500)
(AFESD TDR 62-258) Unclassified report

DESCRIPTORS: *Radar echo areas, Moon, Waveguides, Wave transmission, Reflection, Echo ranging, Transmitter receivers, Measurement.

The radio-reflection properties of the moon at a wavelength of 7.84 meters were studied, and the techniques used to carry out this work are described here. A continuous-wave transmitter was employed, which necessitated the use of a bistatic arrangement for the transmitter and receiver and also precluded short-pulse power vs range-delay measurements. In place of these measurements, the scattering characteristics of the lunar surface were examined by correlating the amplitudes of two signals simultaneously reflected by the moon and by measuring the echo-amplitude autocorrelation. The absolute intensity of the signals shows an average radar cross section for the moon at a wavelength of 7.84 meters to be equal to six percent of the physical area of the projected disk. This value is close to the mean of most other meter-wave measurements. The echo-power spectrum was measured by a method of digital coherent processing of the amplitude and phase. The spectra obtained were unexpectedly broad, indicating the presence of phase perturbations introduced in the earth's ionosphere. Because the expected spectral width of the signals is substantially narrower than that observed, these measurement techniques provide a new method of examining the short-term stability of the ionosphere. (Author)

AD-294 013 Div. 25, 26
(TISTM/EJH) OTS price $1.60

Illinois U., Urbana.
ZONE MELTING OF POTASSIUM CHLORIDE.
Technical note no. 3 on Research on the Electronic Properties of Nonmetallic Crystals,
by T. M. Srinivasan. Dec 62, 10p. illus. 8 refs.
(Contract AF 49(638)529)
Unclassified report

DESCRIPTORS: *Potassium compounds, *Chlorides, *Zone melting, *Purification, Single crystals, Crucibles, Materials, Silicon compounds, Dioxides, Graphite, Chlorine, Controlled atmospheres, Conductivity.

It is possible by straightforward, reproducible, and relatively simple zone refining procedures to produce potassium chloride crystals of a purity superior to that commercially available. The zone refining can be carried out in silica crucibles but should be performed in an atmosphere of chlorine gas to prevent adhesion of the salt to the crucible. Prior to zone refining, the salt should be baked in an atmosphere of chlorine gas. The purity obtained as a result of the zone refining operation depends upon the number of zones passed through the salt ingot but the impurity improves only slightly if more than ten passes are used. The results obtained are similar to those of Grundig but were achieved with a smaller number of zone passes. Potassium chloride that was zone refined in high purity graphite crucibles had graphite specks adhering on or near the surface. Also, it was difficult to cleave single crystals from the ingot for conductivity measurements. The purity of the crystals was of the same order of magnitude as that of the commercially available crystals. (Author)

AD-294 109 Div. 25, 8, 9, 15
(TISTP/JW) OTS price $13.00

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
(No title).
Progress rept. no. 22, 1 Apr-30 Sep 62,
by Ernst Weber. 30 Sep 62, 172p. incl. illus. tables (Rept. no. R-452.22.62)
(Grant AF-AFOSR 62-295, formerly Contract AF 18(600)1505)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electronics, *Electromagnetism, *Solid state physics, *Microwaves, Nonlinear systems, Control systems, Research program administration.

Contents:
Electromagnetics
Plasma electrophysics and electronics
Solid state and materials research
Microwave circuits
Network theory
Systems and control

AD-294 120 Div. 25
(TISTM/ODN) OTS price $1.60

Raytheon Co., Waltham, Mass.
THE SPUTTERING OF COMPOUNDS.

Scientific rept. no. 2 on Investigation of Effects of Ion-Induced Defects on Surface Reactions,
by S. Wolsky, D. Shooter and E. J. Zdanuk.
20 Sep 62, 10p. illus., 22 refs. (Rept. no. S-472)
(Contract AF 19(604)8004, Proj. 5620)
(AFCRL 62-935) Unclassified report

DESCRIPTORS: *Crystals, *Intermetallic compounds, *Gallium alloys, *Antimony alloys, *Antimonides, Crystal structure, Atoms, Vacuum systems, Reliability, Films, Surfaces, Ions.

Sputtering yield data, atom ejection patterns, and sputtered film composition all support a molecular sputtering mechanism of GaSb. The surface structure models used to explain the atom ejection patterns are discussed. Selective sputtering of Ga was noted. Considerable information was obtained concerning the sputtering of diamond structure materials. (Author)

AD-294 141 Div. 25, 27
(TISTP/JW) OTS price $2.60

AVCO Everett Research Lab., Mass.
PLASMA FLOW IN A MAGNETIC ANNULAR ARC NOZZLE,
by R. M. Patrick and W. E. Powers. Sep 62, 26p. incl. illus. table, 4 refs. (Rept. no. AMP-86, Rept. no. NP-12160)
(Contract AF 49(638)659, Proj. 9752)
Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetic fields, *Nozzles, Reynolds number, Impedance, Electrodes, Velocity, Fluid flow.

The performance characteristics of a magnetic annular arc have been experimentally investigated. This configuration consists of two coaxial electrodes separated by an annular passage through which the plasma flows with a steady solenoidal magnetic field throughout the flow region. Initial tests at small magnetic Reynolds number in a constant area configuration demonstrated that the impedance of the magnetic annular arc can be increased by a factor of 25 with the application of an axial magnetic field between the coaxial electrodes. This increased impedance was shown to be due to Hall currents that flow around the annulus between the electrodes. In addition to plasma heating, the interaction between the plasma currents and the magnetic field has produced directed energy comparable to the thermal energy. To exhibit thrust, a 10 degree half angle nozzle was added and surveys of the plasma properties taken at the nozzle exit are presented. A 50 degree half-angle nozzle configuration has also been studied in which most of the plasma currents flow in the expanding flow region. An effort has been made to produce directed axial energy through the interaction of the circulating Hall currents and the radial component of the magnetic field. (Author)

AD-294 142 Div. 25
(TISTP/JW) OTS price $1.60

AVCO Everett Research Lab., Mass.
ELECTROSTATIC ACCELERATION OF NEUTRAL PLASMAS - MOMENTUM TRANSFER THROUGH MAGNETIC FIELDS,
by G. S. Janes, J. Dotson and T. Wilson. Sep 62, 26p. incl. illus. 19 refs. (Rept. no. AMP 88; Rept. no. NP-12154)
(Contract AF 49(638)659, Proj 9752)
Unclassified report

DESCRIPTORS: *Plasma physics, *Acceleration, Heat transfer, Fluid flow, Magnetic properties, Electron diffraction analysis, Electrostatics.

Electrostatic plasma accelerators which avoid the space charge limitations of conventional ion rockets are described. Additional advantages for these devices include moderate requirements on magnetic field strength and on power level. In cylindrical and annular geometries, neutral plasmas can exhibit axial acceleration under the influence of externally applied axial electrostatic fields in the presence of radial magnetic fields. Ions will accelerate freely in the presence of such an axial electric field if both the ion gyro radius and the ion mean free path are large relative to the apparatus size. A critical engineering question concerns the effectiveness of the radial magnetic field in inhibiting the upstream diffusion of electrons. This diffusion is an energy loss mechanism. Both classical and anomalous (Bohm type) electron diffusion models are considered. Experiments are described which substantiate the existence of the mechanism for momentum transfer to neutral plasmas. The experiments are in approximate agreement with the anomalous (Bohm type) diffusion model and are in clear disagreement with the classical diffusion model. The engineering significance of this result and possible approaches for dealing with it are considered. (Author)

AD-294 152 Div. 25, 9
(TISTP/JW) OTS price $3.60

AVCO Everett Research Lab., Mass.
PLASMA BOUNDARY LAYERS,
by James A. Fay. Dec 61, 29p. 58 refs. (Rept. no. AMP-83; Rept. no. NP-12150)
(Contract AF 49(638)659, Proj. 9752)
Unclassified report

DESCRIPTORS: *Boundary layer, *Fluid flow, Electric fields, Conductivity, Convection, Velocity, Magnetohydrodynamics, Propagation, Magnetic properties, Fluid mechanics, Plasma physics.

A review is given of recent work on boundary layers in electrically-conducting fluids. This includes a discussion of the differences between ordinary boundary layers and plasma boundary layers with special reference to the new dimensionless parameters for the magnetic case, including those which arise from the microscopic structure of the fluid. The convection of current and vorticity along magnetic field lines by the Alfven wave mechanism is shown to be the principal new propagation mechanism in magnetohydrodynamic boundary layers. Recent work in inertial boundary layers, channel flows, wakes, and electrode boundary layers is summarized. (Author)

AD-294 183 Div. 25
(TISTE/CAM) OTS price $7.60

Inland Testing Labs., Dayton, Ohio.
QUARTZ CRYSTAL RELIABILITY STUDIES.
Quarterly progress rept. no. 2, 5 July-5 Oct 62, by Carleton E. Jones. 5 Oct 62, 67p. incl. illus. tables.
(Contract DA 36-039-sc-89199)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Reliability, Temperature, Frequency, Resistance, Shock, Vibration, Life expectancy, Heat, Moisture proofing, Corrosion, Test methods, Tables.

Effort was continued to study factors that produce failures of quartz crystal units. The objectives of this study are: (1) the determination of the causes of failure in quartz crystal units; (2) the formulation of accelerated tests

for the determination of time to first failure, meantime between failures, and life time; (3) the evaluation of such factors as elevated temperatures, and drive levels other than the recommended drive levels, in causing failure of quartz crystal units; and (4) the determination of a satisfactory definition of failure in terms of performance. Test methods and test results are presented. (Author)

AD-294 195 Div. 25
(TISTP/WH) OTS price $1.10

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
NEW TECHNIQUES FOR THE VACUUM-ULTRAVIOLET,
by T. D. Wilkerson and R. Lincke. Dec 62, 6p. illus. 14 refs. (Technical note no. BN-307)
(Contracts AF 49(638)401 and AF 19(628)269)
Unclassified report

DESCRIPTORS: *Ultraviolet radiation, *Ultraviolet spectroscopy, *Photomultipliers, Plasma physics, Analysis, Spectrographic analysis.

Methods for improving radiation measurements in the vacuum ultraviolet are discussed. These developments are partially an extension of previous work (Rev. Sci. Instr. 33:911, 1962). The wavelength range considered is 500 - 1500A, corresponding to a photon energy range of 8 - 25 electron volts. (Author)

AD-294 312 Div. 25, 9
(TISTP/JW) OTS price $2.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
MATHEMATICAL DESCRIPTIONS OF POLARIZATION AND RELATED PHENOMENA. PART I. CLASSICAL DESCRIPTION,
by Frank H. Rowsome, III. Aug 62, 21p. incl. illus. refs. (Scientific rept. no. 11)
(Contract AF 19(604)7316, Proj. 4608)
(AFCRL 62-796) Unclassified report

DESCRIPTORS: *Optics, *Wave characteristics, Polarization, Electromagnetism, Radiation effects, Mechanical properties.

A brief review is presented of the mathematical descriptions of polarization which have grown out of experimental optics and classical electromagnetic radiation theory, as well as a review of the classical optical theories relating to polarization phenomena. Emphasis is placed on the interrelation of the formulations. (Author)

AD-294 313 Div. 25, 12, 8
(TISTP/JW) OTS price $3.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
THE REFLECTIVE AND REFRACTIVE PROPERTIES OF IONIZED MEDIA,
by Q. P. Hansen, R. W. Grow and C. C. Johnson. Aug 62, 33p. incl. illus. tables, 8 refs.
(Technical rept. no. SSD-1)
(Contract AF 04(647)745)
(SSD TDR 62-129) Unclassified report

DESCRIPTORS: *Exhaust gases, *Microwave spectroscopy, Reflection, Refraction, Plasma physics, Electric fields, Motion, Damping, Velocity, Electrons, Energy, Optics.

In the determination of the properties of rocket exhausts using microwave techniques, it becomes necessary to know the reflective and refractive nature of the exhaust. The rocket exhaust is a plasma medium. The propagation constants are developed with the assumption that the plasma is a homogeneous isotropic medium whose positive ions are stationary. All motions of the electrons are neglected except those caused by an incident electric field. Damping is assumed proportional to the collision frequency and the velocity of the electrons. The reflective properties of the plasma column are made from a plane wave approach. The index of refraction is determined from Snell's laws applied to conducting media. Optic techniques are used to determine the effects of the plasma column on the reflected and refracted energy. Numerical results are obtained using data from earlier experiments on the rocket exhaust. (Author)

AD-294 330 Div. 25
(TISTP/TL) OTS price $3.60

Remington Rand Univac Div., Sperry Rand Corp., Philadelphia, Pa.
LOW POWER THIN MAGNETIC FILM MEMORY.
Interim engineering rept. no. 3, 5 Oct 62-5 Jan 63.
5 Jan 63, 28p. incl. illus. tables, 2 refs.
(Contract AF 33(657)8679)
Unclassified report

DESCRIPTORS: *Thin films, *Memory devices, *Magnetic coatings, Metal films, Magnetic properties, Diodes, Transistors, Transformers, Electric connectors, Silicon compounds, Ferrite cores, Design.

The feasibility of operating a magnetic thin film memory with currents of approximately 20 ma is investigated. The objective is to be achieved by reducing the magnetic film and drive wire size and by using films with very low values of anisotropy field. Thin Unilloy I films with exceptionally good magnetic properties became available during this quarter and appear to be good enough to use in a reasonably large memory. The high impedance driver was modified to provide pulsed bit operation and data were taken on several films. An easily readable output was obtained with drive currents as low as 25 ma and with bit drive fields substantially lower than the coercivity. A low-impedance tunnel diode driver was also completed and used to test the sample plates. The signal-to-noise ratio obtained using this low impedance driver was excellent. A modified version of this driver has been designed for use in measuring disturb and creep thresholds. The initial design of a four-by-four matrix has been completed. Six operable single bit memory samples were submitted to ASD. (Author)

AD-294 339 Div. 25, 12, 15, 30, 9
(TISTP/JW) OTS price $10.10

Massachusetts Inst. of Tech., Cambridge.
SOLID-STATE AND MOLECULAR THEORY GROUP.
Quarterly progress rept. no. 47.
15 Jan 63, 125p. incl. illus. tables, refs.
(Contracts Nonr-184134 and AF 19(628)356; NSF Grant NSF-G24908)
Unclassified report

DESCRIPTORS: *Solid state physics, *Research program administration, Mathematics, Crystals, Vibration, Orbital flight paths, Ferroelectricity, Lattices, Energy, Solids, Reports, Molecules.

AD-294 343 Div. 25
(TISTP/WA) OTS price $6.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EVALUATION OF VARIOUS MATERIALS AND PROTECTIVE

COATINGS FOR A MACH 8.5 NOSE PROBE IN A WATER-STABILIZED PLASMA JET ARC,
by Richard G. Bradford and Domenic J. Molella.
Dec 62, 67p. incl. illus. 4 refs. (Technical rept. no. 3042)
Unclassified report

DESCRIPTORS: *High temperature research, *Ablation, *Rocket noses, *Guided missile noses, *Hypersonics, *Refractory materials, Plasma jets, Graphite, Tungsten, Carbides, Molybdenum, Refractory coatings.

Twenty-three models of a hypersonic total and static pressure probe consisting of various materials and oxidation-resistant coatings were evaluated in a water-stabilized plasma arc. These models were subjected to varying heat inputs commensurate with expected missile trajectories. Weight tests and macroscopic and microscopic examinations were performed on the models before and after they were subjected to the plasma-arc tests. The following materials and coatings were evaluated: (1) uncoated, unalloyed molybdenum; (2) uncoated graphite; (3) uncoated, unalloyed tungsten; (4) uncoated tungsten carbide containing a cobalt binder; (5) uncoated self-bonded silicon carbide; (6) uncoated Fansteel ''82'' alloy consisting of columbium-tantalum-zirconium; (7) uncoated porous magnesia with resin binder; (8) uncoated zirconium diboride; (9) twelve oxidation-resistance coatings on unalloyed molybdenum; and (10) three oxidation-resistance coatings on graphite. (Author)

AD-294 349 Div. 25, 14
(TISTM/ODN) OTS price $1.75

Nonmetallic Materials Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
A THEORETICAL INVESTIGATION OF CRIMP INTERCHANGE IN A WOVEN FABRIC UNDER BIAXIAL STRESS.
Final rept., Apr-Dec 61 on Fibrous Materials for Decelerators and Structures,
by Peter G. Popper. Aug 62, 56p. incl. illus. tables, 4 refs.
(Proj. 7320)
(ASD TDR 62-457) Unclassified report

DESCRIPTORS: *Textiles, *Fibers, *Threads, Theory, Digital computers, Elasticity, Tables, Configuration, Mathematical analysis, Deformation, Stresses.

The theoretical behavior of a woven fabric which is subjected to biaxial stresses is described. The stress-strain equations are derived for an idealized plain-weave fabric which extends by means of crimp interchange. To obtain solutions to these equations it was necessary to use an iterative procedure on a digital computer. The results were presented in several ways and may be used in the design of such items as pressurized structures. A number of sample solutions using the computer results are given. (Author)

AD-294 357 Div. 25
(TISTP/JW) OTS price $1.25

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
FLOW VISUALIZATION AND QUANTITATIVE GAS DENSITY MEASUREMENTS IN RAREFIED GAS FLOWS.
Final rept. 1 Mar 61-June 62 on Experimental Simulation of Flight Mechanics,
by Robert C. MacArthur, Leroy M. Stevenson and John Budell. Dec 62, 34p. incl. illus. table, 14 refs.
(Contract AF 33(616)8145, Proj. 1426)
(ASD TDR 62-793) Unclassified report

DESCRIPTORS: *Fluid flow, *Density, Gas diffusion, Intensity, Electron beams, Scattering, Hypersonic flow, Gases, Measurement.

The use of an electron beam to stimulate emission from a gas with the resultant beam intensity providing a measure of point-by-point gas density has been investigated. The tests have been conducted in the 1 to 200 micron pressure range, at standard temperature, employing a 5 to 20 key electron beam. Analysis was performed by photographing the beam at conditions of varying density, and examining the film by means of a microdensitometer. A low-cost electron gun capable of projecting a 20 kev, 500 microampere beam across a 24-inch test chamber was successfully developed. The results of the program indicate that at the beam voltages employed, scattering of the electrons by the atoms of the gas severely limits the particular technique used. The analytical and experimental results of the program indicate that gas density measurement and flow visualization may be possible by employing a more energetic electron beam. By observation of the beam-excited emission spectra, it is possible to measure the rotational and vibrational temperature of the nitrogen molecules as well as the number density of nitrogen molecules in the gas. Further investigation of this latter electron beam technique as a diagnostic technique in hypervelocity flows is recommended. (Author)

AD-294 383 Div. 25
(TISTP/JW) OTS price $9.60

Michigan U., Ann Arbor.
BOUNDARY VALUE PROBLEMS IN PLASMA OSCILLATIONS.
Thesis,
by Fred Charles Shure. 1962, 111p. 31 refs.
Unclassified report

DESCRIPTORS: *Plasma physics, *Boundary layer, Linear systems, Ionization, Particles, Theses, Electromagnetic waves, Plasma oscillations, Dielectric properties.

Contents:
Introduction
The Plasma as dielectric
The Vlasov equation
Linearization
Separation into longitudinal and transverse modes
The normal mode expansion for fixed frequency transverse waves
Matrix notation, the adjoint equation and orthogonality
The form of the normal modes
Solutions of the adjoint equation
The normalization coefficients N (Upsilon)
The normal mode expansion and the full range completeness theorem
Specialization to the Boltzmann distribution
Boundary value problems for transverse waves
Boundary conditions
The electromagnetic fields at the boundary
Reflection from a plasma half space
Reflection from a slab
Reflection from a half-space: The diffuse absorber
Digression on the outgoing-wave boundary condition
Propagation along a constant magnetic field
Other applications
Initial value problems
The initial value for transverse modes
Stability and Landau damping
Landau damping of transverse modes
Longitudinal oscillations: fixed frequency modes
Boundary value problems (longitudinal oscillations)

AD-294 395 Div. 25, 16
(TISTM/ODN) OTS price $9.10

Microwave Lab., Stanford U., Calif.
THERMOLUMINESCENCE AND ELECTRON PARAMAGNETIC RESONANCE OF AMINO ACIDS, POLYPEPTIDES AND PROTEINS IRRADIATED WITH ULTRAVIOLET LIGHT,
by J. Gill and M. Weissbluth. Oct 62, 100p. incl. illus. tables, 7 refs. (Technical rept. no. 2; BL rept. no. 77)
(Contract Nonr-22536, Proj. NR 304-492)
Unclassified report

DESCRIPTORS: *Peptides, *Proteins, *Amino acids, *Paramagnetic resonance, *Biophysics, Prolines, Heat, Electrons, Excitation, Ultraviolet radiation, Theory, Reaction kinetics, Polymers, Crystals, Statistical distributions, Histidine, Tryptophan, Electron transitions, Differential equations, Vector analysis, Test equipment, Phenylalanine, Leucine, Tyrosine, Cysteine, Methionine, Aspartic acid, Paramagnetic resonance, Luminescence, Amino acids.

Contents:
Theory and kinetics of thermoluminescence
Results and interpretation of thermoluminescence experiments
Results and interpretation of electron paramagnetic resonance experiments
Outline of calculation of probability for thermal excitation of trapped charge
Computer program for glow curves

AD-294 401 Div. 25, 30
(TISTM/EJH) OTS price $4.60

Metcalf Research Lab., Brown U., Providence, R. I.
THE VISCOSITY OF NITROGEN, HELIUM, NEON, AND ARGON FROM -78.5 C TO 100 C BELOW 200 ATMOSPHERES,
by G. P. Flynn, R. V. Hanks and others. Nov 62, 44p. incl. illus. tables, 46 refs. (Proj. Squid technical rept. no. BRN-3-P)
(In cooperation with Virginia U. Charlottesville,
(Contract Nonr-362300, Proj. NR-098 038)
Unclassified report

DESCRIPTORS: *Nitrogen, *Helium, *Neon, *Argon, *Viscosity, *Viscosimeters, Capillary tubes, Pressure, High pressure research, Temperature, Injectors, Manometers, Thermostats, Density, Measurement, Tables, Mathematical analysis.

A new capillary-flow viscometer has been developed for the measurement of the absolute viscosity of gases as a function of temperature and pressure. In the viscometer a steady flow of gas is maintained through a capillary of known dimensions, and the pressure difference developed across the capillary is measured as a function of the flow rate. From these measurements there are obtained by extrapolation to zero flow rate the absolute viscosity and information on the deviation from Poiseuille flow. The viscosities of nitrogen, helium, neon, and argon have been determined in this viscometer from -78.5 (-50 for helium and neon) to 100 C and up to 200 atm. The experimental results are believed to be accurate within 0.1%. (Author)

AD-294 402 Div. 25, 15, 6
(TISTM/JEA) OTS price $13.00

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE ELECTROMAGNETIC FIELD OF A SOURCE-EXCITED PLASMA SLAB,
by Theodor Tamir. Sep 61, 166p. incl. illus. tables, 31 refs. (Research rept. no. PIBMRI-932-61)
(Contract AF 19(604)4143)
(AFCRL-777) Unclassified report

DESCRIPTORS: *Plasma physics, *Gas ionization, Electromagnetic waves, Excitation, Electron beams, Dielectric properties, Backward-wave oscillators, Detection, Radiation effects, Resonance, Differential geometry, Magnetic fields, Ionization, Hypersonic flow, Ionospheric propagation, Vector analysis, Power supplies, Green's function, Differential equations, Mathematical analysis, Sources, Wave analysis, Wave transmission, Electromagnetic fields.

It was shown that an isotropic dispersive medium, such as the plasma considered, possesses features which are not present in passive, non-dispersive, isotropic, lossless media. The fact that the plasma is frequency dependent and that its dielectric constant may become negative makes possible the existence of backward surface waves which are modes by themselves and complex proper waves which carry no real power but may contain large amounts of stored energy. Other features (e.g., forward surface waves, leaky waves, etc.) are not characteristic of a dispersive medium only and they may occur in conventional homogeneous structures, such as dielectric slabs. Nevertheless, the existence of these additional features was shown to be of considerable importance in radiation problems and other wave aspects involving plasma layers. (Author)

AD-294 414 Div. 25, 9, 15
(TISTP/JW) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
HYDROMAGNETIC FLOW CHARACTERIZED BY LARGE MAGNETIC REYNOLDS NUMBERS,
by Richard Sasiela. 14 May 62, 30p. incl. illus. 9 refs. (Rept. no. PIBMRI-1001-62; Memo. no. 38)
(Contract AF 30(602)2149)
Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetic fields, Non-linear differential equations, Particles, Density, Diffusion, Reynolds number, Fluid flow, Hydrodynamics.

The flow of plasma across a magnetic field is studied in the case of strong interactions. Sets of nonlinear differential equations governing the flow are derived both from the macroscopic and microscopic viewpoint taking into account only binary collisions. The sets of equations are shown to be exactly equivalent and are solved for the steady state distribution of magnetic field strength B and particle density n. Solutions are also derived for the case of anomalous diffusion caused by collective modes and these are compared with the results previously obtained. (Author)

AD-294 416 Div. 25, 30
(TISTM/EJH) OTS price $3.60

New York State Coll. of Ceramics, Alfred U.
SEMICONDUCTING MATERIALS.
Annual summary rept., 30 Nov 61-1 Dec 62,
by Thomas J. Gray, Glenn I. Post and others.
4 Jan 63, 36p. incl. illus. table, 28 refs.
(Contract Nonr-150301, Proj. NR015-215)
Unclassified report

DESCRIPTORS: *Semiconductors, *Thermoelectricity, *Photoconductivity, *Infrared optica materials, Boron compounds, Phosphides, Phase transitions, Heat treatment, Pressure, Decomposition, Single crystals, Thin films, Zinc compounds, Tellurides, Oxides, Selenides, Dielectric properties, Mechanical properties, Thermal conductivity, Measurement, Laboratory equipment, Physical proper'ies, Test equipment.

Contents:
Thermoelectric phenomena
Semiconducting properties of boron phosphide
Photoconductivity
Infrared transmitting materials

AD-294 425 Div. 25, 9, 15
(TISTP/JW) OTS price $1.60

Columbia U., New York.
A SHRINK FIT PROBLEM,
by William R. Spillers. Nov 62, 10p. illus. 11 refs. (Technical rept. no. 16; CU-16-62-ONR 266(78) CE)
(Contract Nonr-26678, Proj. NR 064-446)
Unclassified report

DESCRIPTORS: *Integral equations, *Cylindrical bodies, Solids, Surfaces, Stresses, Pressure, Deformation, Surface properties, Elasticity.

A solution is given for the problem of a solid symmetric elastic cylinder which is stress-free on its surface except for a finite band over which the radial displacement is prescribed. The problem is formulated in terms of dual integral equations for which a series solution is given. The surface pressure is given for several examples. (Author)

AD-294 427 Div. 25, 17
(TISTM/EJH) OTS price $1.10

Keck, W. M., Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
FACE-CENTERED CUBIC COBALT-RICH SOLID SOLUTIONS IN BINARY ALLOYS WITH ALUMINUM, GALLIUM, SILICON, GERMANIUM AND TIN,
by Huey-Lin Luo and Pol Duwez. Dec 62, 7p. incl. illus. table, 7 refs. (Technical rept. no. 10)
(Contract Nonr-22030)
Unclassified report

DESCRIPTORS: *Cobalt alloys, *Lattices, *Phase studies, Aluminum alloys, Gallium alloys, Silicon alloys, Germanium alloys, Tin alloys, Solids, Solutions, Crystal structure.

By rapidly cooling liquid alloys, single phase face-centered cubic cobalt-rich solid solutions have been obtained up to 17.2 at .% aluminum, 18.2 at .% gallium, 13 at .% silicon, 17.4 at .% germanium, and 5 at .% tim. With the exception of silicon, these limits of solubility exceed those found under equilibrium conditions. The variation of lattice parameter with composition has been measured and the data can be fitted with straight lines for all solute elements except gallium, in which a change of slope is observed at 13.2 at .%. (Author)

AD-294 439 Div. 25, 8, 30
(TISTP/JW) OTS price $1.10

Radiation and Solid State Physics Lab., New York U., N. Y.
(No title).
Status rept., 1 June-31 Aug 62. 31 Aug 62, 7p. incl. illus.
(Contract Nonr-28525)
Unclassified report

DESCRIPTORS: *Polarization, *Anthracenes, *Memory devices, Computers, Solid state physics.

AD-294 491 Div. 25
(TISTM/SJR) OTS price $2.60'

Lear, Inc., Santa Monica, Calif.
SEMICONDUCTOR THIN FILMS.
Quarterly rept. no. 1, 1 July-30 Sep 62, by J. M. Axelrod. 30 Sep 62, 23p. incl. illus. tables.
(Contract NObsr-87634)
Unclassified report

DESCRIPTORS: *Semiconductors, *Crystal structure, *Vacuum systems, *Processing, Silicon, Single crystals, Gallium compounds, Arsenides, Germanium, Beryllium compounds, Oxides, Silicon compounds, Carbides, Electron microscopy, Conductivity, Resistance, Thin films, X-ray diffraction analysis, High temperature research.

A new source has been designed to eliminate sticking particles on silicon and any future gallium arsenide deposits. Deposits of germanium, gallium arsenide and silicon have defects which are detectable by x-ray diffraction examination as a light diffuse X centered on the main diffraction spot. Electron microscopy of germanium and gallium arsenide films, peeled from calcium fluoride, which are thin enough for examination shows the presence of enough defects to account for the diffuse x-ray reflections. A small fused silica vacuum system will be made and used for deposition. The system will be baked at 500 - 1000 C while pumped to 1 microtorr, then sealed with molten tin or germanium and cooled. Silicon will be deposited by heating the source and substrate holder inductively. Deposits of germanium and gallium arsenide on calcium fluoride were measured for resistivity and conductivity type and submitted for mobility measurements.

AD-294 492 Div. 25
(TISTP/JW) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
LATERAL WAVES ON AN ANISOTROPIC PLASMA INTERFACE,
by L. B. Felsen. 5 Jan 62, 13p. incl. illus. 3 refs. (Research rept. no. PIBMRI-974-61; Memo. no. 74)
(Contract AF 19(604)4143)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetism, Electromagnetic waves, Ionization, Dielectric properties, Tensor analysis, Radiation effects, Electric currents.

AD-294 493 Div. 25
(TISTP/JW) OTS price $1.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
EXCITATION OF PLASMA WAVES IN A HOMOGENEOUS ISOTROPIC PLASMA BY A DIPOLE,
by A. Hessel and J. Shmoys. 11 July 61, 9p. 1 ref. (Research rept. no. PIBMRI-921-61; Memo. 63)
(Contract AF 30(602)2045)
Unclassified report

DESCRIPTORS: *Plasma oscillations, *Excitation, Electromagnetic waves, Dipole moments, Motion, Gases, Electrons.

Division 25 - PHYSICS

AD-294 494 Div. 25
(TISTP/JW) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE PENETRATION OF MAGNETIC FIELDS IN INCOMPRESSIBLE PLASMAS. PART I,
by Melvin Goldstein. 6 July 61, 24p. (Research rept. no. PIBMRI-919-61; Memo. 28)
(Contract AF 30(602)2149)
Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetic fields, Penetration, Partial differential equations, Compressible flow.

AD-294 495 Div. 25, 9
(TISTB/JW) OTS price $1.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
HYDRO-MAGNETIC STABILITY OF AN ELECTRODELESS PLASMA STRUCTURE,
by K. T. Lian. 20 Oct 61, 9p. illus. 3 refs. (Research rept. no. PIBMRI-956-61; Memo. 34)
(Contract AF 30(602)2149)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Plasma physics, Stability, Switches, Magnetic properties.

AD-294 498 Div. 25
(TISTP/JW) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
SURFACE WAVES ON PLASMA SLABS,
by P. Hirsch and J. Shmoys. 18 Oct 62, 6p. illus. (Research rept. no. PIBMRI-1093-62; Memo. no. 85)
(Contracts AF 19(604)4143 and AF 30(602)2045)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, Linear systems, Surfaces, Dielectric properties, Propagation.

AD-294 496 Div. 25
(TISTP/JW) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON DIFFRACTION BY OBJECTS IN A UNIAXIALLY ANISOTROPIC MEDIUM,
by L. B. Felsen. 31 Aug 62, 11p. incl. illus. 4 refs. (Research rept. no. PIBMRI-1073-62; Memo. 83)
(Contract AF 19(604)443)
Unclassified report

DESCRIPTORS: *Scattering, *Tensor analysis, Diffraction, Radiation effects, Cylindrical bodies, Mathematical analysis, Propagation.

AD-294 499 Div. 25
(TISTP/JW) OTS price $1.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE PENETRATION OF MAGNETIC FIELDS IN INCOMPRESSIBLE PLASMAS. PART II,
by M. Goldstein. 28 June 61, 6p. (Research rept. no. PIBMRI-929-61; Memo. no. 30)
(Contract AF 30(602)2149)
Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetic fields, Penetration, Partial differential equations, Boundary layer, Velocity, Compressible flow.

AD-294 502 Div. 25
(TISTM/ODN) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE QUESTION OF THE CHARGE, MASS, AND ENERGY BALANCE IN THE COLLISION OF SLOW IONS WITH SOLID STATE ATOMS,
by U. A. Arifov. 7 Nov 62, 22p. incl. illus. tables, 7 refs. (Trans. no. FTD-TT-62-851 from Trudy, Tashkentskaya Konferentsiya Po Mirnomy Ispol'zovaniyu Atomnoy Energii, 1:pp. 210-222, 1961)
Unclassified report

DESCRIPTORS: *Ions, *Atoms, *Metals, *Ion bombardment, Contamination, Bombardment, Scattering, Absorption, Adsorption, Electrons, Vaporization, Diffusion, Thermionic emission, Oscillograms, Films, Vanadium, Rubidium, Tungsten, Ionization potentials, Energy, Theory, Ion beams, Surfaces.

During the interaction between ions and a pure cold metallic target a whole series of complex processes occurs simultaneously. The bombarding ions, depending on their energy, are able to eject ions and atoms of the target. If the target is contaminated, they may also eject electrons, ions, and atoms of the contamination. During the interaction between ions and heated metallic targets there are observed in the composition of the secondary currents, in addition to the aforementioned particles, ions which have vaporized from the surface and ions that have diffused from the depths of the target, and also thermionic currents. Along with the investigation of the basic parameters of secondary phenomena (scattering, vaporization, diffusion, cathode sputtering, thermionic emission, adsorption, absorption, and neutralization of ions), the central problem in particle collisions is the problem of the charge, mass, and energy balance of the colliding particles. (Author)

AD-294 504 Div. 25
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Sstems Command, Wright-Patterson Air Force Base, Ohio.
CREATION OF A PHOTOACTIVE SURFACE ON PbS CRYSTALS AND STUDY OF THE PHOTOEFFECT MECHANISM ON IT,
by L. N. Syrnev. 4 Dec 62, 6p. incl. illus. 12 refs. (Trans. no. FTD-TT-62-1517 from Doklady Bolg. AN, 13:3, pp. 269-272, 1960)
Unclassified report

DESCRIPTORS: *Single crystals, *Lead compounds, *Sulfides, Surfaces, Crystals, Electrons, Theory, Preparation, USSR, Photoconductivity.

An effort was made to create a photoactive surface on PbS monocrystals, having electron conduction and having no photo properties of point metallic contact. For this purpose it was necessary to subject the crystals to a processing analogous to that which is employed in the sensitization of PbS layers. Natural crystals with specific resistance of about 1-2 ohms/cm and with electron conduction (n-type conductivity) were used. (Author)

AD-294 509 Div. 25, 9
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE STABILITY OF VIBRATIONS OF A CLAMPED HEATED PLATE TAKING EXCESS AERODYNAMIC PRESSURE INTO

ACCOUNT BY A LINEARIZED THEORY,
by T. Ya. Gert. 14 Nov 62, 5p. 1 ref.
(Trans. no. FTD-TT-62-1483 from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki 6:pp. 163-164, 1961)
Unclassified report

DESCRIPTORS: *Vibration, *Surfaces, Stability, Translations, Aerodynamic heating, Aerodynamic data, Pressure, Linear systems, Gases, Velocity, Fluid flow, Heat.

AD-294 510 Div. 25, 20
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF AMPLIFYING ELECTROMAGNETIC RADIATIONS OF ULTRAVIOLET, VISIBLE, INFRARED AND RADIO WAVE RANGE RADIATIONS,
by V. A. Fabrikant, M. M. Vudynskiy, and F. A. Butayeva. 29 Nov 62, 3p. (Trans. no. FTD-TT-62-1427 from Russian Patent no. 123209 (576749/26), no. 20, pp. 1-2, 1959)
Unclassified report

DESCRIPTORS: *Wave transmission, *Radiation effects, Radio waves, Ultraviolet spectroscopy, Infrared radiation, Wave characteristics, Translations, Amplifiers.

A method of amplifying electromagnetic radiation is proposed, based on the use of induced emission phenomena, theoretically developed by A. Einstein in 1917. At the given method of amplification there is no conversion of energy of amplified radiation into other forms of energy. The method is suitable for amplification of ultraviolet, visible, infrared radio range waves. To bring the described amplification method into realization, a medium is produced having a negative absorption factor for radiations. The intensity of the radiation stream, passed through such a medium, rises, which produces the amplification effect. The amplification factor equals e to the (K)L, where K is the absorption coefficient and L is the thickness of the layer. (Author)

AD-294 514 Div. 25, 15
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE CIRCULAR MOTIONS OF COUPLED PENDULUMS. II,
by V. S. Serebryakova and Ye. A. Barbashin. 30 Nov 62, 10p. 7 refs. (Trans. no. FTD-TT-62-1089 from Izvestiya Vysshikh Uchebnykh Zavedeniy Matematika 4:pp. 112-118, 1961)
Unclassified report

DESCRIPTORS: *Diferential equations, *Motion, Function, Kinetic theory, Translations.

The motion of two pendulums fastened to a stationary axle is examined, taking into account the friction forces between them at the place of suspension. (Author)

AD-294 522 Div. 25
(TISTM/ODN) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION INTO THE FIELD OF SURFACE FORCES (SELECTED ARTICLES).
20 Dec 62, 44p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1195 from Konferentsiya po Poverkhnostnykh Silam, Sbornik, Dokladov Na Konferentsii, Moskva, pp. 99-112, 126-138, 1961)
Unclassified report

DESCRIPTORS: *Organic acids, *Hydrocarbons, *Solids, *Friction, *Liquids, *Dynamometers, Solutions, Test equipment, Surface properties, Thickness, Pressure, Organic solvents, Shear stresses, Metals, Fatty acids, Mechanical properties, Theory, Oscillations, USSR, Surfaces.

The properties of boundary layers, formed by solutions of organic acids in liquid hydrocarbons are considered. An attempt is made to establish the relationship between these layers and the structure, composition, and concentrations of the acids (mainly fatty) and the composition of the solvent. Only the static and quasi-static properties are considered. Work was undertaken to elaborate the preliminary data concerning the relationship between static and kinetic friction which had been obtained by others by means of a dynamometer-motor. (Author)

AD-294 535 Div. 25, 27
(TISTM/ODN) OTS price $9.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STRESS DISTRIBUTION IN COMPRESSOR BLADES DURING VIBRATION (Raspredeleniye Napryazheniy V Kompressornykh Lopatkakh Pri Kolebaniyakh),
by I. I. Meyerovich. 4 Dec 62, 109p. incl. illus. tables, 12 refs. (Trans. no. FTD-TT-62-740 from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, Moskva, 107p., 1961)
Unclassified report

DESCRIPTORS: *Compressor blades, *Stresses, Vibration, Theory, Cantilever beams, Deformation, Rods, Elasticity, Mathematical analysis, USSR, Distribution.

A method is presented for the computation of natural vibrations in compressor blades of compressors of all designs used in the various branches of machine building. For the first time, it has been possible to obtain, on the basis of the theory of plates, a practically convenient solution for calculating the forms and frequencies of the natural vibrations and the stresses in the vicinity of resonance. Diagrams, tables, and approximate formulas that simplify the calculations considerably are presented. Also given is an illustrative numerical calculation for a blade of arbitrary type, with a comparison of the results with experiment. The book is intended for scientific workers and engineers concerned with the problems of designing turbine and compressor blades for various applications. (Author)

AD-294 543 Div. 25, 20
(TISTP/JW) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE RADIATIVE DECAY OF METASTABLE ARGON ATOMS IN A LOW-DENSITY ARGON PLASMA STREAM,
by L. E. Brewer and W. K. McGregor. Jan 63, 23p. incl. illus. tables, 16 refs. (Rept. no. AEDC TDR 63-5)
(Contract AF 40(600)1000)
Unclassified report

DESCRIPTORS: *Plasma physics, *Argon, *Radioactive decay, Density, Luminescence, Supersonic flow, Plasma jets, Atoms, Nitrogen, Deterioration.

A low-density, luminous, supersonic, argon plasma stream about one meter in length produced by a conventional d-c arc plasma generator was studied spectroscopically. The spectra consisted

of neutral argon atom lines and second positive nitrogen bands. Stream enthalpy and velocity calculations rule out thermal excitation and electron-ion recombination as sources of the radiation. Radiative decay of metastable argon atoms will, however, account for the long lifetimes of the radiating argon and also for the excitation of the nitrogen, which enters the stream by mixing with the ambient test cell gas. The existence of metastable atoms and their behavior are further examined by use of additive gases. Atoms with excitation levels below the potential of the argon metastables (hydrogen and krypton) tend to quench the radiation, whereas those with higher excitation levels (helium and neon) have no effect on the argon metastables, and their presence is not spectroscopically detectable. The existence of metastable atoms and the fact that the stream luminosity is caused by their radiative decay plays an important role in diagnostic techniques and renders conventional spectroscopic and probe procedures of little use. The discovery of the metastables within the gas stream, however, provides a further avenue to studies of collision processes. (Author)

AD-294 553 Div. 25, 24
(TISTP/JW) OTS price $3.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
OPTICAL SPATIAL FILTERING TECHNIQUES.
Interim engineering rept. nos. 4 and 5, 1 Apr-30 Sep 62,
by A. B. Vander Lugt and F. Rotz. Jan 63, 33p. incl. illus. 3 refs. (Rept. no. 4594-19-P)
(Contract AF 33(616)8433)
Unclassified report

DESCRIPTORS: *Target recognition, *Optical filters, Signals, Aerial photographs, Optical systems, Interferometers.

The usefulness of spatial filtering techniques in detecting and identifying signals was evaluated. Whereas complex filtering techniques had been applied in only one dimension in the past, an example of two-dimensional filtering is presented in this report, and shown to increase the signal-to-noise ratio as expected. A study relating the signal shape to the rotational correlation function of the signal was undertaken as the preliminary step in determining the optical system's ability to distinguish between two signals with different orientations. Experimental tests show that for a certain class of signals the rotational correlation function produced by the system agrees fairly well with the theoretical predictions. Another study shows how a modified Mach-Zehnder interferometer can be used to determine the phase distribution in the spectrum of an arbitrary distribution of light. An example is given to support the theory. A set of low-frequency rejection filters, which will satisfy the requirements of a wide variety of noise distributions and effective pinhole sizes, was constructed. Also, a closed circuit TV system employing a clipping circuit and (optionally) a saturating amplifier was constructed; examples of its operations show that it has promise as a readout system. (Author)

AD-294 562 Div. 25, 30, 26
(TISTM/EJH) OTS price $6.60

Denver U., Colo.
VACUUM DEPOSITED THERMOCOUPLES.
Master's thesis,
by Richard C. Gerhardt. Dec 62, 59p. incl. illus. tables, 10 refs.
(Contract N123(60530)10049A)
Unclassified report

DESCRIPTORS: *Thermocouples, *Thermoelectricity, *Thin films, Vapor plating, Metallic films, Materials, Semiconductors, Tellurium, Antimony, Aluminum, Bismuth, Resistance, Thickness, Nickel alloys, Aluminum alloys, Metallic smoke deposits, Coatings.

This thesis is concerned with properties which influence the use of thermocouples formed by vacuum deposition. Studies of various single films were made, and the results provided an aid to the understanding of the properties of thin film thermocouples. The thinness of a film forming a vacuum deposited thermocouple is limited by the resistance of the film rather than the thermoelectric power. The thermoelectric powers of the films studied are nearly independent of thickness above the lower limits set by the resistance. Deposition of the thermocouple materials is best done during a single pumpdown of the vacuum system. Silver ink painted over the copper wire leads produced the best contacts between these leads and the thin film. Pure metals exhibited lower thermoelectric power than the corresponding material of lower purity. This is true of some semiconductors in their bulk forms (e.g., tellurium) and it was also found to be true of thin films (e.g., antimony). (Author)

AD-294 575 Div. 25
(TISTP/JW) OTS price $1.25

Aerospace Information Div., Washington, D. C.
PARTICLE ACCELERATORS PRINCIPLES, THEORY, AND DESIGN.
Bibliography.
16 Jan 63, 41p. (AID rept. no. B-63-9)
Unclassified report

DESCRIPTORS: *Particle accelerators, Particles, USSR, Design, Theory, Accelerators, Bibliography.

This bibliography is intended as a guide to Soviet literature on the principles, theory, and design of particle accelerators. Literature from Communist China and other Soviet-Bloc countries is included. The bibliography has been compiled from Soviet monographs, periodical articles, newspapers, conference proceedings, and other public sources. The 413 entries are arranged alphabetically by author within each of the five subject headings. Titles of Soviet monographs are given in transliterated form followed by the English translation. Annotations are provided where clarification is considered necessary. (Author)

AD-294 603 Div. 25, 8
(TISTP/JW) OTS price $2.60

Queensland U. (Australia).
OBSERVATIONS OF TRANS-EQUATORIAL PROPAGATION FROM BRISBANE,
by J. A. Thomas. Mar 62, 25p. incl. illus., 4 refs. (Scientific rept. no. 6)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-343) Unclassified report

DESCRIPTORS: *Radio waves, *Propagation, Magnetic fields, Diurnal variations, Climatic factors, Electromagnetic waves, Signals, Scattering.

Observations of trans-equatorial back-scatter propagation have been analyzed with particular reference to anomalous propagation. Seasonal, diurnal and directional variations are extracted and compared with the behavior of signals propagated via normal modes. Signal strength, fading and phase path measurements have been made at 16 mc/s and preliminary experiments carried out at 55 mc/s and over the range 15-30 mc/s using a back-scatter ionosonde. (Author)

AD-294 608 Div. 25, 9
(TISTP/JW) OTS price $1.60

Queensland U. (Australia).
EXOSPHERIC PROPAGATION EXPERIMENTS,
by J. A. Thomas, B. A. McInnes and J. Crouchley.
Mar 62, 9p. incl. table, 17 refs. (Scientific rept. no. 11)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-348) Unclassified report

DESCRIPTORS: *Exosphere, *Radio waves, Echo ranging, Ionosphere, Electrons, Density, Magnetic fields, Propagation, Scattering.

Experiments were carried out at 16 and 55 mc to search for possible exospheric propagation of back-scatter signals. A negative result was obtained over 6 weeks of continuous recording. The parameters of the system are examined and it is shown that if Gallet and Utlaut did, in fact, observe this type of propagation, then it should also have been observed at Brisbane. (Author)

AD-294 668 Div. 25, 17
(TISTM/SJR) OTS price $1.60

Merck and Co., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS.
Progress rept. no. 4, 1 Dec 60-31 Jan 61,
by P. I. Pollak, J. B. Conn and others.
31 Jan 61, 15p. incl. illus. tables.
(Contract NObs-78503, Proj. SR 010024)
Unclassified report

DESCRIPTORS: *Semiconductors, *Antimony alloys, *Bismuth alloys, *Tellurium alloys, *Electrical properties, Thermal conductivity, Thermal diffusion, Mercury alloys, Selenium alloys, Vanadium alloys, Metallurgy, Processing, Crystal structure, Lattices, X-ray diffraction analysis, Resistance, Thermoelectricity.

Two further alloys in the system BiSbTe were investigated in order to complete our evaluation bracketing Alloy 68 compositions. The systems selected were $Bi_{28}Sb_{48+x}Te_{134-x}$ and $Bi_{12}Sb_{70+x}Te_{158-x}$. In general, the two alloys seem to fall in line chemically with Alloy 68 in that effects of compositional changes on the electrical properties become minimized as the antimony content of the alloy increases. This is in line with our concepts of poising. Introduction of selenium into the antimony-rich alloy leads to an overall degradation of the figure of merit. Investigations were continued in the analogous vanadium alloy system of Alloy 68. The compositions turned out to be nearly degenerate and further work was discontinued. Substitution of arsenic for antimony was carried out in an alloy system patterned after Alloy 68, but experimental difficulties have to date precluded any reasonable results. Elimination of bismuth from this system leads to alloys in the series SbAsTe which have proven to be p-type materials with low Seebeck coefficients. (Author)

AD-294 702 Div. 25, 4
(TISTM/RGR) OTS price $2.60

Textile Research Inst., Princeton, N. J.
DIMENSIONAL AND STRUCTURAL CHANGES DURING DENATURATION OF HELICAL TYPE MACROMOLECULES,
by A. V. Tobolsky and V. D. Gupta. Jan 63, 1v. incl. illus. 12 refs. (Technical rept. no. 32)
(Contracts Nonr-09000 and Nonr-09001)
Unclassified report

DESCRIPTORS: *Polymers, *Phase transitions, Helixes, Theory, Molecular structure, Adenine derivatives, Glutamyl radicals, Benzyl radicals, Proteins, Nucleic acids, Peptides, Thermodynamics, Crystal structure.

A theory for quantitative description of reversible helix-coil type phase transition in macromolecular systems is given. The transition is characterized by (1) the fraction of helical content, (2) sequence length of the crystalline regions, (3) sequence length of the amorphous regions, and (4) mean square end-to-end distance. The results for per cent helical or crystalline content are compared with experimental values for polybenzyl glutamate and oligoadenylic acid. (Author)

AD-294 721 Div. 25
(TISTP/JW) OTS price $4.60

Washington U., Seattle. Coll. of Engineering.
AN EXPERIMENT ON TURBULENT FLOW IN A PIPE WITH A FLEXIBLE WALL.
Master's thesis,
by Larry Lacross Smith. 1963, 37p. incl. illus. tables, 4 refs.
Unclassified report

DESCRIPTORS: *Turbulent flow, *Boundary layer, Pressure, Reynolds number, Fluid flow, Theses, Pipes, Elasticity.

The results of an experimental investigation of the effects of a flexible boundary on pressure drop in turbulent flow in a pipe are reported. A test section was made by casting a highly compliant, elastic gel between two concentric pipes. The inner pipe was then removed leaving a flexible boundary for flow studies. Fluid was caused to flow through the test section and pressure drop measurements were recorded at Reynolds numbers ranging from 1800 to 15,200. The pressure drop across the flexible boundary was found to be greater than that encountered in a similar section with a solid boundary. Below Re 13,500, this increase can be explained either in terms of effective wall roughness or by an effect of the flexible boundary on turbulence. Above Re 13,500, the data indicate a pressure drop increase due to the effects of the flexible boundary. (Author)

AD-294 787 Div. 25, 8
(TISTE/CRJ) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
TEMPERATURE-CONTROLLED OVEN,
by P. E. Mulvihill. May 62, 11p. incl. illus. tables, 1 ref. (ASRDL technical rept. 2278)
Unclassified report

DESCRIPTORS: *Ovens, *Quartz crystals, *Crystal ovens, Aging, Temperature, Control, Electronic equipment, Storage, Temperature control.

An oven for storing small electronic parts at controlled elevated temperatures to 85 C is described. Its performance is demonstrated with temperature charts. The temperature control is simple and independent of complex circuitry. The oven accommodates thirty crystal units and occupies an area nineteen inches wide by seventeen inches deep. The front panel is twenty-six inches high. The average power consumption at 25.0 ± 5.0 C ambient is thirty watts during the on-period of the control cycle. It maintains a temperature stability of 0.01 C which is more than adequate to meet the temperature stability specified in paragraph 4.7.15 of MIL-C-3098C for preproduction aging measurements. (Author)

AD-294 841 Div. 25, 9
(TISTP/JW) OTS price $2.60

Ecole Normale Superieure (France).
DEUTERON ELECTROMAGNETIC FORM FACTORS,
by Michel Gourdin. Nov 62, 22p. incl. illus.
14 refs. (Technical note no. 7)
(Grant AF EOAR 63-47)
Unclassified report

DESCRIPTORS: *Deuterons, *Electrons, Elasticity, Wave characteristics, Electromagnetic waves, Polarization, Scattering.

AD-294 844 Div. 25, 6
(TISTW/PCR) OTS price $3.60

Electro-Optical Systems, Inc., Pasadena, Calif.
COHERENT OPTICAL SURVEILLANCE DEVICES.
Quarterly summary rept. no. 3,
by Richard E. Bradbury. 1 Dec 62, 27p. incl.
illus. 3 refs. (EOS rept. no. 2230-Q-3)
(Contract AF 30(602)2710, Proj. 4506)
(RADC TDR 62-606) Unclassified report

DESCRIPTORS: *Phase shifters, Interferometers, Mercury lamps, Lasers, Helium, Neon, Calibration, Mathematical analysis, Equations, Power dividers, Attenuation, Beams, Phase distortion, Photomultipliers, Interference, Volume, Optical equipment, Light.

A gas cell phase shifter has been constructed and evaluated in a Twyman-Green interferometer, with both a low pressure mercury lamp (5461 Angstroms) and a helium-neon laser (6328 Angstroms) as sources. Measurements of phase shift by fringe displacement correspond well with expected results. (Author)

AD-294 849 Div. 25, 9, 8
(TISTP/JW) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DATA TRANSMISSION TESTING FROM DONNELLY FLATS, ALASKA, TO SUNNYVALE, CALIFORNIA OVER A TD-2 MICROWAVE CIRCUIT,
by Paul L. Grant. 29 Nov 62, 24p. incl. illus.
3 refs. (Rept. no. 25G-12)
(Contract AF 19(628)500)
(AFESD TDR 62-264) Unclassified report

DESCRIPTORS: *Microwave networks, *Electrical currents, Reliability, Data processing systems, Transmitter receivers, Errors, Measurement, Tests.

A summary is presented of data measurements presented from 14 November 1961 to 19 January 1962 evaluating the performance of the coded biphase data modem over a microwave facility from Donnelly Flats, Alaska, to Sunnyvale, California. The complete circuit length was 4,203.7 miles. Occurrence of errors is related as much as possible to the daily log and the record of equipment failures, interruptions, and circuit failures. (Author)

AD-294 856 Div. 25, 14
(TISTM/ODN) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ABSORBING MATERIAL USING PARALLEL RESISTANCE SHEETS,
by K. Suetake and J. W. E. Griemsmann. 14 Aug 62,
18p. illus. (Rept. no. PIBMRI-1060-62)
(Contract AF 19(604)7499, Proj. 4600)
(AFCRL 62-799) Unclassified report

DESCRIPTORS: *Absorption, *Materials, *Dielectrics, Propagation, Sheets, Honeycomb cores, Analysis, Resistance, Theory, Impedance, Vector analysis, Electromagnetic effects.

An electromagnetic analysis is obtained for propagation in an infinite stack of parallel resistive sheets spaced by lossless dielectrics. The direction of propagation and the electric vector are both parallel to the sheets. A wide range of parameters is covered, including those pertinent for absorbers and those showing the expected reduction to the case of an anisotropic homogeneous lossy medium under appropriate conditions of relatively close spacing. (Author)

AD-294 858 Div. 25
(TISTP/JW) OTS price $4.60

Aerospace Corp., El Segundo, Calif.
WAVE PROPAGATION IN A TWO-LAYERED MEDIUM,
by J. P. Jones. 15 Oct 62, 37p. incl. illus.
4 refs. (Rept. no. TDR-169(3230-11)TN-7)
(Contract AF 04(695)169)
(SSD TDR 62-197) Unclassified report

DESCRIPTORS: *Wave characteristics, Elasticity, Reentry aerodynamics, Surfaces, Blast, Atmosphere, Pressure, Cylindrical bodies, Propagation.

Elastic wave propagation in a medium consisting of two finite layers is considered. Two types of solutions are treated. The first is a Rayleigh train of waves. For this case, when the wave length becomes short, the waves approach two Rayleigh waves plus a possible Stoneley wave. When the wave length becomes large, there are two waves: a flexural wave and an axial wave. Calculations are presented for this case. The propagation of SH waves is treated, but no calculations are presented. (Author)

AD-294 876 Div. 25
(TISTW/PCR) OTS price $6.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MODAL ANALYSIS AND SYNTHESIS OF ELECTROMAGNETIC FIELDS,
by L. B. Felsen and N. Marcuvitz. 24 Sep 62,
64p. incl. illus. 51 refs. (Rept. no. PIBMRI-1057-62)
(Contract AF 19(604)7499, Proj. 4600)
(AFCRL 62-762) Unclassified report

DESCRIPTORS: *Electromagnetic fields, *Electric currents, Synthesis, Dielectrics, Transmission, Impedance, Configurations, Complex variables, Special functions, Integral equations, Conductors, Analysis, Mathematical analysis.

Contents:
Radiation problems in plane stratified regions
Sources in the presence of a dielectric slab
Sources in the presence of a surface with non-vanishing surface impedance
Sources in the presence of a multi-layered medium
Some examples involving continuous source distributions
Approximate boundary conditions representative of highly lossy, and of certain reactive interfaces
Radiation problems involving media with negative real dielectric constant

AD-294 877 Div. 25
(TISTP/JW) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
RADIATION FROM A UNIAXIALLY ANISOTROPIC PLASMA HALF SPACE,
by L. B. Felsen. 27 Aug 62, 41p. incl. illus. 21 refs. (Research rept. no. PIBMRI-1058-62)
(Contract AF 19(604)4143, Proj. 5635)
(AFCRL 62-759) Unclassified report

DESCRIPTORS: *Plasma physics, *Plasma oscillations, Optics, Integral equations, Refraction, Reflection, Fourier analysis, Radiation effects, Magnetic fields, Frequency.

A line source of magnetic currents is located in a half space with uniaxially anisotropic dielectric constant, with the optic axis inclined at an arbitrary angle to the interface. This two-dimensional, scalar diffraction problem is solved by Fourier integral techniques, and the solution is examined in the asymptotic range of large distance from the source. The radiation field comprises incident, reflected and refracted ray contributions whose properties are determined from a study of the refractive index curves for the medium. In addition, there may exist a lateral wave which is excited by a critically refracted incident ray, and which sheds energy back into the anisotropic medium by refraction. If the medium is a plasma with an externally impressed infinite d.c. magnetic field, and if the source oscillates below the plasma frequency, there exist shadow regions from which the direct and reflected rays are excluded but which can be penetrated by the lateral waves. (Author)

26. PRODUCTION AND MANAGEMENT

AD-293 832 Div. 26
(TISTB/DGH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
SUPPORT REQUIREMENTS FOR OPPORTUNISTIC REPLACEMENT AND INSPECTION POLICIES,
by J. J. McCall. Dec 62, 27p. incl. illus. 13 refs. (Memorandum no. RM-3369-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Maintenance, *Management engineering, *Scheduling, Effectiveness, Calculus of variations, Analysis of variance, Probability, Statistical processes, Logistics, Quality control.

Requirements of opportunistic replacement inspection policies are examined: the expected number (per unit time) of opportunistic (joint) replacements of the uninspected part and one of the monitored parts; the expected number (per unit time) of planned replacements of the uninspected part; the probability of a certain number of failures of a monitored part in a specified interval of time; the expected number (per unit time) of opportunistic inspections -- inspections of the non-monitored part which are triggered by failures of the monitored part; and the expected number (per unit time) of planned inspections of the non-monitored part. As an example the opportunistic replacement policy is applied to the rocket engines of a hypothetical ballistic missile. This illustrative analysis indicates that both the expected number (per unit time) of opportunistic (joint) replacements of the rocket engines and re-entry vehicle and the expected number (per unit time) of replacements of the rocket engines due to mandatory replacement are highly sensitive to changes in the rocket engine failure rate. The expected number (per unit time) of opportunistic (joint) replacements of the rocket engines and the guidance and control system is relatively unaffected by changes in the engine failure rate. (Author)

AD-293 863 Div. 26, 1
(TISTA/GEC) OTS price $6.60

RAND Corp., Santa Monica, Calif.
AIRCRAFT AIRFRAME COST ESTIMATING TECHNIQUES,
by J. M. Carrier and R. W. Smith. Nov 62, 59p. incl. illus. tables, 4 refs. (Research memo. no. RM-3375-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Aircraft, *Airframes, Labor, Materials, Tools, Production, Turbojet engines, Mathematical prediction, Management engineering, Costs.

An introduction to cost estimating techniques, specifically those applying to aircraft airframes are described. Each major cost element, e.g., labor, materials, etc., is treated, and a procedure is presented for estimating both nonrecurring and recurring airframe costs. This procedure is described as a series of steps which theoretically lead to the correct answer. As experienced estimators will realize, every estimating situation is different and what is intended to be an illustrative procedure should be used with discretion in making actual estimates. (Author)

AD-294 006 Div. 26, 17, 12
(TISTW/EJH) OTS price $2.60

Nuclear Metals, Inc., Cambridge, Mass.
DEVELOPMENT OF IMPROVED FABRICATION METHODS, PROCESS AND TECHNIQUES FOR PRODUCING TYPICAL AIRCRAFT SHAPES FROM BERYLLIUM,
by R. G. Jenkins and J. M. Siergiej. 28 Dec 62, 14p. incl. illus. tables (Report no. NMI-9701.3)
(Contract AF 33(657)8783)
Unclassified report

DESCRIPTORS: *Beryllium, *Drawing (Machine processing), *Extrusion, Aircraft, Dies, Machine tools, Manufacturing methods, Design.

In a program to develop a complete manufacturing process for the production of beryllium channels, techniques are being sought for drawing to obtain a final product meeting specifications more rigorous than are obtainable by direct extrusion. Progress in designing and procuring the special tooling required to draw complex shapes at elevated temperature is described, and the first set of draw dies is evaluated with respect to design and quality. Three experimental draw attempts were made on U-channels, in addition to draw tests on flats. (Author)

AD-294 356 Div. 26
(TISTB/DGH) OTS price $1.60

California U., Berkeley.
MAINTENANCE POLICIES FOR SYSTEMS WITH SEVERAL PARTS,
by R. Radner. Nov 62, 17p. 14 refs. (Technical rept. no. 8)
(Contract Nonr-22277, Proj. NR-047-029)
Unclassified report

Division 26 - PRODUCTION AND MANAGEMENT

DESCRIPTORS: *Maintenance, *Scheduling, Statistical processes, Probability, Theory, Management engineering, Quality control.

For systems composed of several parts, a class of maintenance policies is proposed according to which decisions on replacement or inspection for one part are a function of the state of the other parts. Some examples of applications to preventive maintenance and to preparedness models are given. (Author)

AD-294 516 Div. 26, 17
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ARGON-ARC AND ELECTRON-RAY WELDING OF TANTALUM AND NIOBIUM,
by N. V. Grevtsev. 10 Dec 62, 13p. incl. illus. tables, 11 refs. (Trans. no. FTD-TT-62-1244 from Svarochnoye Proizvodstvo 2, pp. 8-12, 1962)
Unclassified report

DESCRIPTORS: *Electron beams, *Tantalum, *Niobium, *Arc welding, Electron guns, Tensile properties, Mechanical properties, Argon, USSR, Gases, Plasticity, Electrodes, Welding, Welded joints, Translations.

A comparative investigation was made of welded tantalum and niobium joints, obtained during argon-arc and electron-ray welding. Recommendations on the welding of these metals by fusion are presented. The characteristics of tantalum and niobium welding are determined by their high melting point and high activity with respect to gases (oxygen and nitrogen) at higher temperatures. At a higher content of gases there is a substantial change in the mechanical characteristics - the ultimate strength rises during stretching and hardness, plasticity decreases. For example, for niobium, an increase in oxygen content from 0.02 to 0.75% leads to an increase in hardness from HV 100 to HV 350. (Author)

AD-294 568 Div. 26, 17
(TISTM/EJH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
AUSFORMING BY EXTRUSION,
by Yu. N. Kabanov, N. I. Korneyev and others.
9 Jan 63, 1p. (AID rept. no. S-63-5; Trans. from Extruded Super-strength Steel Semiproducts. Byulletin' tekhniko-ekonomicheskoy informatsii, no. 10, pp. 37-38, 1962)
Unclassified report

DESCRIPTORS: *Steel, *Extrusion, Austenite, Heat, Manufacturing methods, USSR, Processing.

The article describes a method of ausforming in which a high-strength steel was extruded in the condition of a metastable austenite. BL-1-type-steel (0.45% C, 1.19% Si, 1.52% Mn, 1.74% Cr, 2.21% Ni, 0.80% W, 0.46% Mo) melted in an open induction furnace was preforged into billets. The billets were encased in carbon steel or copper envelopes 0.5 to 2.5 mm thick, which acted as solid lubricants during extrusion. The billets were extruded at 803 to 853 K on a 1000-ton vertical press. At these temperatures, BL-1-type steel has a true strength of 150 to 170 kg/sq.mm and a reduction of area of 80%. The lubricating effect of the envelopes, combined with the low extrusion rates, made it possible to extrude the steel with a specific pressure of 130 to 160 kg/sq.mm and a reduction as high as 90%. Bars extruded with a 90% reduction had a tensile strength of 280 kg/sq.mm and an elongation of 6%. Extrusion with a reduction of 50% resulted in a tensile strength of 240 kg/sq.mm and an elongation of 7.5%. (Author)

AD-294 569 Div. 26, 17
(TISTM/EJH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
FORGING OF HEAT-RESISTANT STEEL DISKS,
by M. Ya Dzugutov and V. P. Stepanov. 20 Dec 62, 3p. incl. illus. (AID rept. no. 62-205; Trans. from New Method of Producing Disk Forgings from Ingots by Upsetting, Kuznechnoshtampovochnoye proizvodstvo no. 10, pp. 10-14, 1962)
Unclassified report

DESCRIPTORS: *Stainless steel, *Steel, *Forging, *Disks, Manufacturing methods, Grains (Metallurgy), Deformation, Mechanical properties, USSR.

A new forging technique, which eliminates repeated swaging and upset-forging operations, has been developed for the XH77TYP heat-resistant alloy (Nimonic 75) and XH35BTY heat-resistant steel. Rough-machined 1000-, 700-, and 450-kg ingots with bottom and head portions removed can be upset in two steps. In the first step, carbon-steel dummies 25 mm thick are placed between the ingot and the flat dies to reduce contact friction and obtain more uniform deformation. The flat dies are preheated at 500 to 600 C and lubricated with graphite powder. In this first step, the ingot is upset to a height of 50 to 60 mm above the required height. Final upsetting to the required size, the second step, is performed without dummies. Visual and ultrasonic inspection, macro- and micro-analyses, and short-time and stress-rupture tests show that disks forged by the method have (1) less pronounced barreling than those obtained by conventional forging, (2) approximately the same surface finish, (3) no surface cracks, (4) higher tensile and impact properties at room temperature, (5) practically the same rupture life at 750 C under a stress of 30 kg/sq.mm, and (6) better anisotropy. (Author)

AD-294 585 Div. 26, 17
(TISTM/ODN) OTS price $2.50

Alloyd Corp., Cambridge, Mass.
A STUDY OF ELECTRON-BEAM WELDING.
Quarterly rept. no. 3,
by S. S. White. May 62, 1v. incl. illus. 10 refs.
(Contract DA 19-020-ORD-5484, Proj. 5B93-32-004)
(Technical rept. no. WAL 401.54/2-4)
Unclassified report

DESCRIPTORS: *Welding, *Electron beams, *Titanium alloys, *Steel, *Stainless steel, Impact shock, Aluminum alloys, Vanadium alloys, stresses, Welded joints, Refractory materials, Hardness, Fracture (Mechanics), Heat treatment, Bibliography, Mechanical properties, Welds.

Techniques previously developed for the utilization of the electron beam as a practical tool for post heating of titanium alloys have been applied to the Ti-2 1/2, Al-16V alloy. With slight modifications, these techniques have been found applicable to H-11 hot work die steel, and types A-286 and 301 stainless steels. Electron beam post heat generally caused increased strains and impact resistances without strength losses. It was established that strength increases are most feasible when electron beam post heating is applied to materials work hardened prior to welding. Correlations between steel gaseous content and impact resistance are also discussed. (Author)

AD-294 591 Div. 26, 17
(TISTM/ODN) OTS price $1.60

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING OF REFRACTORY METALS.
Progress rept. no. 10, 1 Aug-30 Sep 62,
by Harold L. McKaig, Jr. 27 Dec 62, 12p. incl. illus. tables.
(Contract NOw 61-0410-c)
Unclassified report

DESCRIPTORS: *Refractory materials, *Welding, *Ultrasonics, *Molybdenum alloys, Alloys, Fracture (Mechanics), Tensile properties, Shear stresses, Titanium alloys, Foils.

Attention was given to ultrasonic welding of Mo-0.5Ti alloy. Although prior study had shown that Mo-0.5Ti demonstrated metallurgical characteristics conducive to good ultrasonic welding, the material had also shown a tendency to crack under some circumstances. Similar to the determinations for D-31 alloy, indications are that the quality of refractory metals in general, and their contamination in particular, may well be the major controlling factors contributing to difficulties encountered in the ultrasonic welding of this alloy. (Author)

AD-294 598 Div. 26, 11
(TISTM/ODN) OTS price $1.10

Aerospace Information Div., Washington, D. C.
DIE FORGING WITH COUNTERPRESSURE,
by A. V. Rebel'skiy and V. A. Zolotnitskiy.
8 Jan 63, 2p. incl. illus. (AID rept. no. S-63-3; Trans. for Closed-Impression Die Forging with Counterpressure. Kuznechno-Shtampovochnoye Proizvodstvo, no. 10, pp. 1-5, 1962)
Unclassified report

DESCRIPTORS: *Dies, *Forging, *Forge presses, Transmission gears, Gears, USSR, Pressure.

AD-294 621 Div. 26, 17
(TISTM/EJH) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF IMPROVED CUTTING TOOL MATERIALS.
Interim technical documentary progress rept., 25 Sep-24 Dec 62,
by F. C. Holtz. Jan 63, 27p. incl. illus.
(Rept. no. ARF-B6000-3)
(Contract AF 33(657)8786)
(ASD TDR 7-714, vol. 1) Unclassified report

DESCRIPTORS: *Cutting tools, *Steel, *Carbide tools, *Refractory materials, Carbides, Carbon alloys, Vanadium compounds, Vanadium alloys, Atomization, Casting, Sintering, Hardness, Density, Surfaces, Heat treatment, Composite materials, Grains (Metallurgy), Powders, Melting, Microstructure, Oscillation, Manufacturing methods.

Experimental work has involved the preparation and initial evaluation of a wide range of cutting tool materials produced by a variety of techniques. An M2 high-speed steel base was enriched in vanadium, then forged into bar stock. Material containing up to 18wt% vanadium was fabricable, but none of the vanadium-enriched compositions were heat treatable without subsequent enrichment in carbon by solid-state surface carburization. This procedure should result in a tool material having a tough core with a hard, high-carbon surface layer. The casting of an M1 high-speed steel into an oscillating mold produced a much finer distribution of carbides than similar material cast into stationary mold. Initial atomization experiments using an M2 high-speed steel produced partially spheroidized particles generally finer than 80 mesh. No massive carbides were observed in the microstructures. Studies of liquid-phase sintered carbides included 2 general work areas. The first, utilizing iron-, nickel-, or cobalt-containing matrix phases, was concerned with the development of fine, spheroidized carbides, principally VC. The second work area involved wettability and sintering studies of various carbides with high-melting matrix phases. (Author)

27. PROPULSION SYSTEMS

AD-293 821 Div. 27, 10, 4
(TISTM/ODN) OTS price $1.60

Martin-Marietta Corp., Denver, Colo.
BIBLIOGRAPHY OF FLUORINE FOR USE IN LIQUID ROCKET ENGINES (PROPERTIES, HANDLING, STORAGE AND SAFETY),
comp. by Clyde Briggs. 1 July 61, 13p. (Literature search no. 13)
Unclassified report

DESCRIPTORS: *Bibliography, *Rocket motors, *Liquid rocket propellants, *Fluorine, Storage, Safety, Handling, Fluorides, Propellant properties.

AD-293 913 Div. 27, 10
(TISTM/RGR) OTS price $10.50

Rocketdyne, Canoga Park, Calif.
PROPELLANTS FOR ELECTRICAL PROPULSION ENGINES OF THE CONTACT OR BOMBARDMENT ION TYPE.
Annual rept. no. 2 (Final), 15 Mar 61-15 Mar 62
on Aviation Fuels,
by V. E. Bedwell, H. E. Dubb and others.
16 Nov 62, 132p. incl. illus. tables, 47 refs.
(Rept. no. R-3556)
(Contract AF 33(616)7063, Proj. 3048)
(ASD TR 61-150, pt. 2)
Unclassified report

DESCRIPTORS: *Electric propulsion, *Ion beams, *Molecules, *Colloids, *Propellants, Accelerators, Electrostatic accelerators, Stability, Mercury, Laboratory equipment, Particle beams, Decomposition, Ionization, Measurement, Radiation effects, Electron bombardment, Vapor pressure, Polycyclic compounds, Quinones, Metalorganics, Silanes, Phosphine oxides, Nitrides, Ferrocenes, Anthracenes, Phenanthrenes, Indantarenes.

Materials and methods for producing molecular ions and a colloidal ion beam suitable for use in electrical propulsion devices are investigated. The molecular compounds were selected for study primarily on a basis of expected favorable ionization characteristics and high structural stability to fragmentation. A theoretical analysis of a colloid producing system which utilizes a convergent-divergent nozzle for rapid condensation of propellant is presented. Electrical charging of the droplets is accomplished by ionizing a fraction of the propellant vapor prior to expansion through the nozzle. A graphical approach for obtaining approximate thermodynamic conditions necessary to adiabatically condense propellant vapors in a typical colloid generating system is introduced. Experimental results from operation of a charged, mercury colloid generator are presented. (Author)

AD-294 138 Div. 27
(TISTA/FRL) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
ZERO SECONDARY FLOW EJECTOR-DIFFUSER PERFORMANCE

USING ANNULAR NOZZLES,
by R. C. German, J. H. Panesci and H. K. Clark. Jan 63, 38p. incl. illus. tables, 7 refs. (Rept. no. AEDC TDR 62-196)
(Contract AF 40(600)1000, Proj. 6950)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Exhaust gas ejectors, Starting, Pumps, Pressure, Thrust, Operation, Design, Supersonic nozzles, Configuration, Aerodynamic configurations, Exhaust diffusers.

An investigation was conducted to determine the performance of zero-secondary flow ejector-diffuser systems using annular driving nozzles. Eight annular nozzles with various geometries, including one expansion-deflection (E-D) nozzle, were tested in cylindrical diffusers having various diffuser lengths. The ejector starting and pumping characteristics were compared and found similar to the empirical relations developed for ejectors having conventional convergent-divergent nozzles. The unique problems associated with simulated altitude testing of the E-D nozzle and the effects of ejector-diffuser design on E-D nozzle performance are discussed. A method is described for determining the ejector pumping characteristics when the ejector is unstarted to satisfy the annular nozzle test requirement for altitude simulation at conditions other than minimum cell pressure. (Author)

AD-294 178 Div. 27, 20
(TISTA/GEC) OTS price $12.50

General Dynamics/Fort Worth, Tex.
3Mw ASTR,
by J. B. McGuffin, C. W. Dickenson and others. 18 Aug 61, 286p. incl. illus. tables, 18 refs. (Rept. nos. NARF 61-19R; FZK-9-161)
(Contract AF 33(600)38946)
Unclassified report

DESCRIPTORS: *Nuclear power plants, Hazards, Design, Test facilities, Control systems, Instrumentation, Hydraulic systems, Calibration, Operation, Test equipment.

A detailed and comprehensive description of the GD/FW 3-Mw Aerospace Systems Test Reactor (ASTR) and its associated systems is presented. The purpose of this document is two-fold: (1) to enlighten persons who are not familiar with the 3-Mw ASTR and its capabilities, and (2) to serve as a working manual to the reactor operations personnel who are vested with the responsibility of the safe operations of the ASTR under its many and varied shielded configurations. (Author)

AD-294 430 Div. 27
(TISTA/GEC) OTS price $1.10

Naval Ordnance Test Station, China Lake, Calif.
THERMAL UNDERWATER POWER PLANTS,
by James H. Green. Nov 62, 10p. incl. illus. (Rept. no. NOTS TP 2876)
Unclassified report

DESCRIPTORS: *Torpedo turbines, Design, Underwater propulsion, Feasibility studies, Torpedo propellants, Heat engines, Steam turbines, Theory.

All the thrust producers for torpedoes except the pulsejet, ramjet, and rocket require a rotative power source to drive the active element. In the velocity range up to 100 knots the thrust producers that appear most feasible are those that do require a rotating power source. Discussion of the portion of the underwater propulsion system that comprises such a power plant is confined to the chemically fueled thermal power plants. (Author)

AD-294 536 Div. 27
(TISTP/JW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RESTORATION AND EXAMINATION OF THE L. A. SUKHAREV CO-ORDINATE MEASURING MACHINE,
by G. A. Plyugin. 21 Nov 62, 22p. incl. illus. tables, 7 refs. (Trans. no. FTD-TT-62-744 from Izvestiya Glavnoy Astronomicheskoy Observatorii v Pulkove 22:1, pp. 184-196, 1960)
Unclassified report

DESCRIPTORS: *Measurement, *Astronomical data, Translations, Photographic equipment, USSR, Instrumentation.

A description is given of the co-ordinate measuring machine designed to measure 240 x 240 mm negatives. The basic operations in the restoration of the measuring machine, which was damaged during the war, are described. Studies of the progressive and periodic repairs to the screw and curvature of the guiding prism are cited. Results of the examination indicate the good quality of the machine, which is entirely usable for exact astrographic measurements. (Author)

AD-294 687 Div. 27, 26, 17
(TISTM/ODN) OTS price $7.60

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE.
Quarterly interim technical rept. no. 8, 1 July-30 Sep 62,
by W. E. Helfrich and H. A. Hauser. 31 Oct 62, 1v. incl. illus. tables.
(Contract DA 19-020-ORD-5230, Proj. 5B93-32-004)
Unclassified report

DESCRIPTORS: *Rocket cases, *Titanium alloys, Heat treatment, Tensile properties, Dies, Forging, Welding, X-ray diffraction analysis, Mechanical properties, Steel, Microstructure, Alloys, Porosity, Deformation, Welds, Fracture (Mechanics), Hardness, Aging, Tests, Manufacturing methods.

The results of work performed on the research and development of a high strength, lightweight titanium alloy rocket case are reported. These results include: (1) smooth tensile properties (70F) of a sub-scale 14-inch diameter flow-turned cylinder vacuum-annealed at 1400F and re-solution-treated at 1800F prior to flow-turning, (2) cyclic loading test results on TIG-welded B-120 VCA titanium alloy and AISI H-11 steel, (3) tensile properties (70F) of full scale 40-inch diameter front and rear domes press-forged in closed dies at 1750F, and (4) tensile properties (70F) of a subscale 14-inch diameter cylinder re-solution-treated at 1800F prior to flow-turning.

AD-294 695 Div. 27, 26
(TISTM/RGR) OTS price $2.00

Defense Metals Information Center, Columbus, Ohio.
DESIGN CONSIDERATIONS IN SELECTING MATERIALS FOR LARGE SOLID-PROPELLANT ROCKET-MOTOR CASES,
by C. W. Bert and W. S. Hyler. 10 Dec 62, 60p. incl. illus. tables, 54 refs. (DMIC rept. no. 180)
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Rocket cases, *Design, Rocket motors, Stresses, Thermal stresses, Reliability, Structural shells, Mathematical analysis, Structures, Space environmental conditions, Mechanical properties, Fatigue (Mechanics), Composite materials, Guided missiles, Titanium alloys, Aluminum alloys, Glass textiles, Sandwich construction, Honeycomb cores, Beryllium, Wire, Resins, Feasibility studies.

Design considerations that influence the selection of materials for rocket-motor cases are discussed. The main intent is to clarify considerations of design for the benefit of the materials specialists in the aerospace industry and for the benefit of the materials industries which supply the aerospace industry. A brief discussion is given of types of missiles and mission profiles. This is followed by a discussion of the external and internal loads and environment to which the missile is subjected. The mechanical and thermal loads are reacted by the motor case acting as a structure; hence, a discussion of stresses and other design factors is included. Next, structural safety and reliability are discussed from a design point of view. The following aspects of basic material behavior are discussed in relation to motor-case design requirements: static mechanical behavior, fatigue behavior, thermal effects, and other environmental effects. In order to provide realistic criteria for materials selection, design for minimum weight is presented from the material-index point of view. Considerations not related directly to design, for example, producibility, cost, and corrosion resistance, are not included. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-293 884 Div. 28
(TISTB/MS) OTS price $5.60

Laboratory of Aviation Psychology, Ohio State U. Research Foundation, Columbus.
RESEARCH ON AUGMENTED FEEDBACK AND THE ACQUISITION AND TRANSFER OF SKILL.
Final rept.,
by George E. Briggs. 5 Sep 62, 49p. incl. illus. tables, refs. (Rept. no. 3)
(Contract N61339-836)
(NAVTRADEVCEN 836-3) Unclassified report

DESCRIPTORS: *Learning, *Transfer of training, *Training, Feedback, Control systems, Effectiveness.

Three experiments are reported. Augmented feedback, when indicating that the subject was in error, was significantly more useful than such feedback when used to indicate that the subject was performing acceptably. The second study indicated that withdrawal of additional feedback information is least disruptive when the criterion for providing this information is progressively relaxed, and it is most disruptive when inconsistently available during withdrawal. The third study was not conclusive, but did suggest that complex criteria for the study of additional feedback information can be effective in training for continuous control (tracking) skill. (Author)

AD-294 122 Div. 28, 30
(TISTB/DGH) OTS price $2.60

System Development Corp., Santa Monica, Calif.
THE AUTOMATION OF PSYCHOTHERAPY,
by J. Meany. 12 Dec 62, 24p. refs. (Rept. no. SP-1050)
Unclassified report

DESCRIPTORS: *Psychotherapy, *Neuro psychiatry, Computers, Theory, Automation, Programming.

A study of the implications of automation for psychotherapy is presented. The growth in the use of computers, their power and capacity, as well as some of their applications in the behavioral sciences, are indicated. A study of the various techniques of computer programming which would affect the man-machine relationship in an automated type of psychotherapy is presented. These programming techniques include fixed sequence programs, alternative sequence programs, and varied sequence computer programs. Some of the relationships between computer programming techniques and different theoretical positions in psychology are indicated. For example, the Skinner approach seems to stress a fixed sequence approach to programming while a client-centered therapy approach would seem to necessitate a varied sequence approach with the computer being programmed to be responsive to the needs of the client. Some of the effects of using information retrieval equipments on automated psychotherapy are indicated. A brief review of the research on student-oriented teaching machines along with the implications of this research for psychotherapy machines are presented. How a computer could be actually applied to psychotherapy is discussed along with the psychological theory upon which this application is based. Some of the problems, values, and social consequences involved in the automation of psychotherapy are presented. (Author)

AD-294 336 Div. 28, 16
(TISTB/MS) OTS price $1.10

Creedmoor Inst. for Psychobiologic Studies, Queens Village, N. Y.
BINARY RECORDING OF VOCALIZATION AND GROSS BODY MOVEMENT DURING PSYCHOPHYSIOLOGICAL OBSERVATION OF DOGS,
by Michael Kaplan and Eugenie F. Kaplan. Jan 63, 4p. illus. 1 ref. (Technical rept. no. 3)
(Contract Nonr-285000)
Unclassified report

DESCRIPTORS: *Motor reactions, *Laboratory equipment, *Recording devices, Dogs, Test equipment, Automatic, Identification, Physiology, Laboratory animals, Verbal behavior.

Apparatus is described that converts vocalizations and certain gross body movements of dogs into switch closures for binary indexing of these events on cardio-respiratory records. (Author)

AD-294 582 Div. 28, 6
(TISTB/MS) OTS price $6.60

Texas U., Austin.
EFFECT OF CERTAIN NOISES UPON DETECTION OF VISUAL SIGNALS.
Doctoral thesis,
by William H. Watkins. Jan 63, 53p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Visual signals, *Noise, Stimulation, Visual acuity, Visual thresholds, Visual perception, Attention, Detection, Perception.

Alteration of the mode of presentation of auditory stimuli of moderate intensity was found to exert a marked influence upon visual signal detection performance by a group of human subjects. The effect is regarded as a facilitatory variety of sensory interaction and is greater in terms of performance improvement magnitude (percentage) than that characteristic of CPF experimentation involving heteromodal facilitation. Ten-burst per second auditory flutter (in positive synchrony with light signal when present) produced effects not substantially different from steady white noise effects. The superior detection condition was that in which noise accompanied the alternative observation intervals, as distinct from continuous noise presentation. The neural mechanism mediating this interaction is possibly similar to that observed in implanted cat brain studies showing heightened neuronal responses to given sensory stimuli as functions of heteromodal stimulation, or electrical stimulation of nervous tissue. This experiment does not permit assignment of any locus for the central or peripheral neural correlates of the overt behavior. The notion of efferent sensitization, of the arousal response sort, would accommodate the results obtained. (Author)

AD-294 731 Div. 28, 30
(TISTB/MS) OTS price $2.60

RAND Corp., Santa Monica, Calif.
GPS, A PROGRAM THAT SIMULATES HUMAN THOUGHT,
by A. Newell and H. A. Simon. 30 Mar 61, rev. 10 Apr 61, 26p. incl. illus. table, 16 refs.
(Rept. no. P-2257)
Unclassified report

Presented at a conference on Learning Automata sponsored by the Technical Information Society of the Federal Republic of Germany, Karlsruhe, Germany, 11-14 Apr 61.

DESCRIPTORS: *Reasoning, *Computers, *Programming, Theory, Mathematical logic, Theory, Simulation, Cybernetics, Psychology.

Effort was directed toward showing that the techniques that have emerged for constructing sophisticated problem-solving programs also provide us with new, strong tools for constructing theories of human thinking. They allow us to merge the rigor and objectivity associated with behaviorism with the wealth of data and complex behavior associated with the gestalt movement. To this end their key feature is not that they provide a general framework for understanding problem-solving behavior (although they do that too), but that they finally reveal with great clarity that the free behavior of a reasonably intelligent human can be understood as the product of a complex but finite and determinate set of laws. Although we know this only for small fragments of behavior, the depth of the explanation is striking. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-293 838 Div. 29, 16
(TISTB/DGH) OTS price $5.60

Pennsylvania State U., University Park.
DIETARY CONDITIONING FOR NUTRIENT RESTRICTION IN HUMANS,
by K. H. Fisher, E. D. Huang and others.
June 62, 48p. incl. illus. tables, 10 refs.
(Contract AF 41(657)316, Proj. 8238-16)
(AAL TDR 62-1) Unclassified report

DESCRIPTORS: *Metabolism, *Diet, *Military rations, Starvation, Dehydrated substances, Ketones, Nitrogen, Blood sugar, Stress (Physiology), Food, Nutrition, Tests.

Eight young adult men were used to investigate the metabolic effect of controlled 9-day periods of dietary conditioning on subsequent 5-day periods of caloric restriction (stress periods). Half of the subjects were conditioned with diets high in fat (about 68 per cent) while the others had diets low in fat (about 10 per cent). Each day of the stress periods a 148-gram portion of pemmican (about 1000 calories) was ingested by each subject. The criteria used to follow the metabolic response of the subjects were blood glucose levels, excretion rates of urinary ketone bodies, and nitrogen balances. The change in the average blood glucose level from the conditioning periods to the stress periods was not as drastic for the low fat conditioned men as for the men conditioned on diets high in fat. Neither the excretion rates of urinary ketone bodies nor the nitrogen balances were improved appreciably during the stress periods by either type of dietary conditioning. Comparisons based on body size showed that the smallest men of the group had higher blood glucose levels and lower excretion rates of urinary ketone bodies in the second stress period than did the larger men. The catabolism of tissue protein did not appear to be related to body size. (Author)

AD-294 190 Div. 29
(TISTB/DGH) OTS price $2.60

Army Airborne, Electronics and Special Warfare Board, Fort Bragg, N. C.
EVALUATION OF MULTIPURPOSE FABRIC NET.
19 Dec 62, 26p. incl. illus. (Proj. CE 862)
Unclassified report

DESCRIPTORS: *Nets, *Hammocks, Acceptability, Military operations, Nylon.

The multipurpose fabric net, is a lightweight, olive green, nylon net. It weighs one pound and is approximately six feet wide and eight feet long with a 9/16 inch mesh. It has selvage along the long side with the nylon ends melted together on the short side. The test item in a hammock configuration is strong enough to support a 200-pound man. It can be wadded and placed into a fatigue trouser pocket. The test item is designed to provide a suitable net of minimum size and weight. The net is satisfactory with respect to: Size and weight, and its use as an improvised hammock, an improvised litter, for caching supplies, as a sniper's roost, a camouflage net, for catching fish and trapping small animals, air delivery and air transport operations. (Author)

AD-294 449 Div. 29
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
FIELD TESTS OF TWO ANTI-EXPOSURE ASSEMBLIES,
by Paul W. Barnett. May 62, 16p. incl. illus. 8 refs. (Rept. no. AAL TDR 61-56)
(Proj. 8242-2)
Unclassified report

DESCRIPTORS: *Protective clothing, *Exposure, Pressure suits, Underwater clothing, Arctic regions.

The insulative value of the Navy MK-5 anti-exposure suit and the Air Force CSU4/P partial pressure suit was determined in wet and dry cold environments. Human subjects were exposed to both environments while wearing each assembly. Results of these exposures are shown in graphs of skin and rectal temperatures. A discussion of the results is presented. The MK-5 and CSU4/P assemblies when used with additional protective equipment may be considered adequate protection for dry still air temperatures of -30 F. The MK-5 and liner is adequate protection for water survival in excess of 8 hours. The CSU4/P is adequate water survival protection for periods in excess of two hours. Additional insulation will increase the capability of either assembly during water immersion. (Author)

AD-294 861 Div. 29, 28
(TISTB/DGH) OTS price $3.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
FOOD CONSUMPTION AND PREFERENCES UNDER CONDITIONS OF RESTRICTED AND NON-RESTRICTED FEEDING.
Interim rept. on Human Factors in Quartermaster Corps Operations,
by David R. Peryam and Richard W. Seaton.
Dec 62, 31p. incl. tables, 4 refs.
(AMXFC rept. no. 40-62)
Unclassified report

DESCRIPTORS: *Food, *Feeding, *Military personnel, Selection, Acceptability, Stress (Physiology), Arctic regions, Consumption, Determination, Attitudes.

Twenty men trekked on foot for two 10-day periods across the Greenland icecap, half on full rations and the others on half rations. Under restricted feeding food preferences increased and 97 percent of available food was eaten. Positive and high correlations (.51-.86) between preference and consumption were found for all groups and under all experimental conditions. Underfed men tended to reject the same type of foods as full-fed men. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-293 843 Div. 30
(TISTP/JW) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
A PHRASE-STRUCTURE LANGUAGE TRANSLATOR.
Research rept.,
by A. L. Bastian, Jr. Aug 62, 43p. incl. illus. tables (Rept. no. AFCRL-62-549)
(Proj. 4641)
Unclassified report

DESCRIPTORS: *Translations, *Computers, *Machine translation, Language, Theory, Programming, Computers.

A syntax-directed translator is described with several new features which result in much faster running time and the ability to handle longer input strings. The computer program for the translator is described in detail, and an example of its operation is provided. (Author)

AD-293 886 Div. 30
(TISTP/JW) OTS price $11.00

Naval Ordnance Lab., Corona, Calif.
FOUNDATIONAL RESEARCH PROJECTS.
Quarterly rept., July-Sep 62.
1 Dec 62, 144p. incl. illus. tables, refs.
(NAVWEPS rept. no. 7237)
Unclassified report

DESCRIPTORS: *Research program administration, Optics, Microwaves, Semiconductors, Conductors, Antennas, Solid state physics, Solids, Rare earth, Electrochemistry, Spectrographic analysis, Noise, Polymers, Reports.

AD-293 898 Div. 30, 27
(TISTA/GEC) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CRYOGENICS AS APPLIED TO THE DESIGN AND FABRICATION OF A SPACE SIMULATION TEST CELL,
by S. P. Ansley, Jr. Jan 63, 35p. incl. illus. 10 refs. (Rept. no. AEDC TDR 62-201)
(Contract AF 40(600)1000, Proj. 6950)
Unclassified report

DESCRIPTORS: *Space environmental conditions, *Altitude chambers, Test facilities, High altitude, Pumps, Rocket research, Rocket motors, Combustion, Ignition, Design, Liquefied gases, Nitrogen, Gases, Helium, Refrigeration systems, Liquid cooled, Simulation, Cryogenics.

The increasing need for simulation of conditions encountered in orbital and space exploration flights resulted in the development of an ultra-high altitude rocket cell. The system was designed to not only expose the vehicle to space conditions, as in a conventional space environmental chamber, but also to provide actual ignition, restart, and full-scale combustion tests under near space conditions. A description is given of the effort to extend test capabilities by combining established altitude testing methods with such recent advances as large scale cryogenic pumping. By these methods, rocket engine ignition and restart tests at pressure and temperature conditions in excess of 400,000 ft can now be simulated as well as a variety of other tests utilizing the features and methods described. (Author)

AD-293 925 Div. 30
(TISTP/JW) OTS price $3.60

California U., Los Angeles.
PROBLEMS IN INFORMATION ECONOMICS,
by Jacob Marschak. 25 Nov 62, 35p. incl. illus. 18 refs. (Working paper no. 24)
(Supported by the Office of Naval Research, Proj. NR-047-041 and the Western Management Science Inst., under its grant from the Ford Foundation)
Unclassified report

DESCRIPTORS: *Information theory, *Research program administration, Costs, Computers, Data processing systems, Probability, Distribution, Economics.

AD-293 995 Div. 30
(TISTP/JW) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A DATA PROCESSING FORMALISM,
by A. W. Armenti, B. J. Schafer, and J. M.

Winett. 6 Nov 62, 33p. incl. illus. table, 6 refs. (Technical rept. no. 283)
(Contract AF 19(604)7400)
(AFESD TDR 62-257) Unclassified report

DESCRIPTORS: *Programming, *Data processing systems, Control systems, Design, Machine translation, Sequences, Computer logic, Human engineering, Language, Computers.

AD-294 099 Div. 30, 13, 26
(TISTW/JEA) OTS price $3.60

ARINC Research Corp., Washington, D. C.
STUDY AND DEVELOPMENT OF QUANTITATIVE ANALYSIS TECHNIQUES FOR OFFENSIVE GUIDANCE EQUIPMENT.
Semi-annual rept.
31 Dec 62, 37p. incl. illus. tables (Publication no. 209-2-346)
(Contract AF 33(657)7382)
Unclassified report

DESCRIPTORS: *Maintenance, *Reliability, *Design, *Failure (Mechanics), *Air force equipment, Tests, Probability, Fire control systems, Jet fighters, Quality control, Radar navigation, Maintenance personnel, Mathematical prediction, Control systems, Electronic systems, Costs.

Research is presented on the development of procedures and techniques which will provide the Air Force with a set of criteria and measures for evaluating or, as need be, predicting system value, and thus assist the Air Force in the procurement of systems of maximum value. By the nature of evaluation and prediction, these developments may also yield guide lines which the Air Force can use to improve the value of existing systems or to assure the value of systems yet to be added to the weapon complement. (Author)

AD-294 119 Div. 30, 18, 26
(TISTP/MAK) OTS price $9.10

RAND Corp., Santa Monica, Calif.
AUTOSATE: PART II. EVENT-CHAIN FLOW CHARTING, by O. T. Gatto and E. M. Fairbrother. Dec 62, 92p. incl. illus. tables (Memo. no. RM-3320-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Data, *Information theory, *Programming, *Feasibility study, *Management engineering, Analysis, Design.

An automated technique which provides information on data system flows and characteristics at the expenditure of considerably less manpower and in a more usable form than was previously possible was described previously in AD-275 499. The event-chain flow charting phase of that technique and the results of a field test of a proposed depot maintenance data system using the event-chain procedures are described. Also included are the computer program flow charts and Fortran instructions. Material presented should be of special interest to those in the Directorate of Data Automation at Hq USAF; to the Systems Command, and to others who will conduct data system studies. (Author)

AD-294 124 Div. 30, 5
(TISTP/JW) OTS price $7.60

Sylvania Electronic Systems, Needham, Mass.
MOBIDIC DIGITAL COMPUTER PROGRAM. MOBIDIC C.
Final rept. 1 July 58-16 Oct 61.
16 Oct 61, 1v. incl. illus. tables.
(Contract DA 36-039-sc-78100, Proj. 3-28-02-201)
Unclassified report

DESCRIPTORS: *Digital computers, Mobile, Data processing systems, Programming, Information retrieval, Information theory, Design.

The major activities undertaken during the course of the MOBIDIC C project from its beginning 1 July 1958 through 16 October 1961 are summarized. Described herein are leading characteristics of the system and the individual units which make up the system. Overall conclusions relating to equipment design together with resulting recommendations are treated. Also, summarized are all conferences held, lectures given, and publications generated during the life of the project. (Author)

AD-294 150 Div. 30, 8, 16, 32
(TISTB/KG) OTS price $3.50

Armed Services Technical Information Agency, Arlington, Va.
BIONICS AND RELATED RESEARCH. AN ASTIA REPORT BIBLIOGRAPHY.
Bibliography for 1953-Dec 62,
comp. by Katye M. Gibbs. Jan 63, 218p.
1087 refs.
Unclassified report

DESCRIPTORS: *Automation, *Biology, *Electronics, *Sensory perception, *Simulation, *Bibliography, *Computers, *Neuromuscular transmission, *Servo systems, Auditory perception, Learning, Machine translation, Reading machines, Scientific research, Perception, Visual signals, Nervous system, Electrical networks, Library science, Mathematical logic, Reasoning, Synthesis, Theory, Brain.

This bibliography was prepared by ASTIA to provide a guide to unclassified literature on bionics and related research. References are included for documents cataloged by ASTIA from 1953 to December 1962, as well as citations to published literature. The 1087 selected references in this compilation cover such broad subject areas as adaptive control systems, sensory phenomena, anatomical physiology, automata theory, neuromuscular transmission, mechanical simulation, learning phenomena, interdisciplinary modeling, artificial intelligence and machine learning. A classified section of this bibliography will appear as AD-333 850.

AD-294 160 Div. 30
(TISTP/JW) OTS price $13.00

Computation Center, Mass. Inst. of Tech., Cambridge.
RESEARCH AND EDUCATIONAL ACTIVITIES IN MACHINE COMPUTATION BY THE COOPERATING COLLEGES OF NEW ENGLAND.
Semi-annual progress rept. no. 11.
July 62, 174p. incl. illus. tables, refs.
(Contract Nonr-184169)
Unclassified report

DESCRIPTORS: *Computers, *Research program administration, Mathematical computer data, Programming, Scientific research, Operation.

AD-294 177 Div. 30, 25
(TISTM/EJH) OTS price $10.10

MRD Div., General American Transportation Corp., Niles, Ill.
DEDUCTION OF SHOCK TESTING METHODS AND FACILITIES CRITERIA.
Final technical rept.,
by R. S. Weiner. Dec 62, 115p. incl. illus. tables, 22 refs. (Rept. no. MR 1165)
(Contract DA 49-146-xz-083)
(DASA-1328)
Unclassified report

DESCRIPTORS: *Shocks, *Stresses, *Nuclear explosions, *Impact shock, *Structures, Loading, Shock resistance, Shock waves, Joints, Beams, Test equipment, Wave transmission, Test methods.

Criteria are deduced for shock-testing methods and facilities to test components which must sustain the severe mechanical shocks of nuclear environments. Longitudinal and transverse stress pulses propagating through elementary structural members are studied to provide insight to the more complicated problems of pulses propagating through a general piece of equipment. The effect of higher-frequency oscillations which accompany the nuclear environment is investigated by comparing the response of spring-mass systems subjected to similar pulses without the higher frequencies. Three major conclusions concerning such criteria can be drawn: (1) shock-test equipment must be able to produce those sharp rise times (on the order of a microsecond) which can be expected in a nuclear environment; (2) mounting of test items must be such that the sharp-rise-time input is transmitted all the way to the test item; and (3) the superposition of hash (higher-frequency oscillations superposed on the basic pulse profile) on step inputs to test items is not of major significance in shock tests. (Author)

AD-294 306 Div. 30, 15
(TISTP/JW) OTS price $4.60

Land-Air, Inc., Point Mugu, Calif.
COMPOSING MATHEMATICS ON A TYPEWRITER,
by C. E. Black. 24 Nov 62, 39p. incl. illus. 6 refs. (Rept. no. 41)
(Contract N-123(61756)19425A/PMR)
Unclassified report

DESCRIPTORS: *Typewriters, *Mathematics, *Printing, Research program administration, Handbooks.

Typists are instructed in details of composing mathematical expressions with a typewriter. Many illustrations of equations having indexed numbers, fractions, radicals, integrals, and limits are given. Such supplementals as Typit and interchangeable type are introduced. A discussion of special typewriters, reproduction methods, typing media, and handfinishing is included. An appendix contains a table of proofreader's marks selected exclusively for typewritten copy. Several pages from earlier math papers are appended as models. (Author)

AD-294 318 Div. 30
(TISTP/JW) OTS price $1.10

RAND Corp., Santa Monica, Calif.
STATUS REPORT OF DETAB-X (DECISION TABLE, EXPERIMENTAL),
by Solomon L. Pollack. Jan 63, 7p. incl. illus. table, 18 refs. (Rept. no. P-2687)
Unclassified report

DESCRIPTORS: *Data processing systems, *Research program administration, Feedback, Operations research, Computer logic.

AD-294 404 Div. 30, 12
(TISTM/RGR) OTS price $11.50

Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
STUDY OF BERYLLIUM BURNUP AND DISPERSION FOR RE-ENTERING NUCLEAR AUXILIARY POWER SYSTEMS.
Rept. for 1 Feb-29 Nov 62,
by A. L. Feild, Jr. Dec 62, 152p. incl. illus. tables, 52 refs. (Rept. no. WANL-TNR-064)
(Contract AF 29(601)5078, Proj. 1831)
(AFSWC TDR 62-119) Unclassified report

DESCRIPTORS: *Beryllium, *Atmosphere entry, *Nuclear power plants, Reflectors, Ablation, Computer logic, Aerodynamic heating, Radioactive fall-out, Oxidation, Reaction kinetics, Hazards, Particles, Drops, Mathematical prediction, Toxicity.

Analytical studies were conducted to determine (1) orbital re-entry burnup behavior of beryllium reflectors in SNAP reactor systems and (2) toxic hazard produced at ground level by ablated and dispersed beryllium residue from re-entering SNAP reflector. Digital computer programs were formulated to calculate trajectories, aerodynamic heating, oxidations, and mass loss rates of specific beryllium shapes re-entering under proposed flight program conditions. Concluding studies postulated actual re-entry of a SNAP-10A reflector. Toxic hazards were determined by calculation of atmospheric dispersal and fallout of beryllium particles in the toxic size range. Studies concluded that varying degrees of reflector burnup will occur, depending upon re-entry attitude and point of release from the reactor assembly. However, no toxic hazard will exist at ground level even with complete reflector burnup at lowest possible altitude. (Author)

AD-294 454 Div. 30, 5
(TISTP/JW) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 5, INFORMATION PROCESSING.
Quarterly progress rept., 1 Sep-30 Nov 62.
15 Dec 62, 17p. incl. illus. tables, refs.
(Contract AF 19(628)500)
(AFESD TDR 62-256) Unclassified report

DESCRIPTORS: *Data processing systems, *Digital computers, *Reports, Circuits, Telephone communication systems, Solid state physics, Transition elements, Voice communication systems, Speech representation, Speech transmission, Computers, Magnetic materials, Electronic equipment, Mathematical analysis, Films, Memory devices, Design.

AD-294 512 Div. 30
(TISTB/DGH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BEASTS AND MACHINES. CYBERNETIC TRAINING,
by Izrail' Gutchin. 23 Nov 62, 5p. (Trans. no. FTD-TT-62-1503 from Kommunist, p. 4, col. 1-6, 26 July 62)
Unclassified report

DESCRIPTORS: *Cybernetics, *Training, USSR, Automatic, Machines.

AD-294 528 Div. 30, 15
(TISTP/JW) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STATISTICAL METHODS OF RESEARCH (SELECTED ARTICLES).
31 Dec 62, 44p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1192 from Statisticheskiye Metody Issledovaniya, Teoriya Struktur, Modelirovaniye, Terminologiya, Obrazovaniye Izdatel'stvo Akademii Nauk SSSR, Moskva, pp. 106-124, 357-367, 1961)
Unclassified report

DESCRIPTORS: *Statistical analysis, *Mechanics, Relays, Research program administration, Translations, Stability, Quality control, Dynamics.

Contents:
Joint stability and quality control and its application in statistical dynamics
Mechanization of analysis and synthesis of relay apparatus

AD-294 546 Div. 30
(TISTA/GEC) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
A SONIC ANEMOMETER FOR THE STUDY OF TURBULENT WIND LOADING ON MISSILES,
by J. Chandran Kaimal. Oct 62, 11p. incl. illus. 4 refs. (Rept. no. AFCRL 62-1064) (Proj. 7655)
Unclassified report

DESCRIPTORS: *Anemometers, *Guided missiles, Load distribution, Turbulence, Gust loads, Design, Mathematical analysis, Instrumentation.

The design of a sonic wind component meter particularly suited for the study of turbulent wind loading on a stationary missile is described. The instrument measures eddy fluctuations in the wind along two horizontal axes with an array consisting of one emitter and four receivers. Careful analysis of possible errors shows that measurements should be accurate to within 5%. (Author)

AD-294 611 Div. 30
(TISTE/CAM) OTS price $7.60

Armour Research Foundation, Chicago, Ill.
INSTRUMENTATION AND MEASUREMENT TECHNIQUES STUDY.
Quarterly progress rept. no. 15, 1 Aug-31 Oct 62, by T. R. Shaifer. 31 Oct 62, 71p. incl. illus. 10 refs. (Rept. no. ARF 5112-Q15) (Contract DA 36-039-sc-78269, Proj. 3G89-01-021-01)
Unclassified report

DESCRIPTORS: *Measurement, *Instrumentation, *Test equipment, *Test sets, Electric currents, Digital computers, Voltage, Teletype systems, Sideband, Signal-to-noise ratios, Speech transmission, Ferrites, Oscilloscopes, Cameras, Theory, Transistors, Magnetic recording systems, Electrical equipment, Electronic circuits.

A practical in-circuit transistor leakage current tester is described. This device requires only simple operating procedures, and is capable of reading leakages below one microamp. The leakage tester actually constructed has measured leakages as low as one microampere with a collector load of 500 ohms. A theoretical computer study of fault location on open wire transmission lines utilizing the pulse echo technique was completed. Theoretical and experimental research indicates that the storage type oscilloscope method should allow the rapid location of faults on open wire transmission lines with a simple electronic test system. A study of the problem of rapid fault location of modules or components in electronic systems by internal means was initiated. Two methods are described. One method uses chemical voltage indicator cells, which exhibit a color change when the voltage across the terminals exceeds approximately 1.6 volts dc, and the other method uses small ferrite core indicators, which give an output signal variation proportional to the amount of dc current in a wire. (Author)

AD-294 644 Div. 30, 25, 8
(TISTP/JW) OTS price $15.00

IBM Research Center, Yorktown Heights, N. Y.
PROJECT LIGHTNING.
Quarterly progress rept. no. 6 (Final) Vol. 2, Appendix A.
31 May 60, rev. 1 Oct 60, 218p. incl. illus. tables, 26 refs. (Supersedes AD-250 677) (Contract NObsr-77508)
Unclassified report

DESCRIPTORS: *Computers, *Low temperature research, Design, Thin films, Circuits, Switching circuits, Diodes, Superconductivity, Superconductors, Electronic circuits, Cryogenics.

Contents:
A review of the thin-film cryotron
Combined electrical and thermal analysis of a cryogenic circuit
Transient analysis of cryotron networks by computer simulation
Switching characteristics of Esaki diode circuits
Electrical switching-speed considerations in a simple thin-film superconducting circuit
Superconducting-compound studies
Trapped-flux experiments
Energy exchange in a cryotron flip-flop operating with less than total current transfer
Annealing kinetics of thin films deposited on liquid-nitrogen-cooled substrates
Experimental investigation of the thermal properties of thin-film cryotron gates
Theoretical temperature dependence on frequency
Operation and analysis of planar cryotrons and simple cryotron circuits

AD-294 646 Div. 30, 26
(TISTM/EJH) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ASSEMBLY OF PRECISION FERRITE POT CORE INDUCTORS,
by Robert Berg and Bradford Howland. 17 Dec 62, 10p. incl. illus. (Rept. no. 52G-6) (Contract AF 19(628)500) (AFESD TDR 62-260)
Unclassified report

DESCRIPTORS: *Coils, *Ferrite cores, *Inductance, Manufacturing methods, Resin adhesives, Cements, Magnetic susceptibility.

3B5 Ferrite pot cores are available in a range of permeability values determined by air gap length. To facilitate exact adjustment of inductance of coils made with these cores, a slug tuning insert is available which provides a range of adjustment of from ±0.8% to ±2% depending on the length air gap chosen. In order that the completed inductor be at a previously determined value with a suitable range of adjustment tolerance remaining, it is necessary that one be able to assemble the cores to give an inductance error not exceeding a few tenths of a percent. For inductance accuracies and stabilities of this magnitude, new assembly methods had to be devised. The conventional technique, using a bolt through the core centering holes, produced large air gap distortion. Gluing together the two halves of the pot core appears at present the most promising technique for achieving initial accuracy and long term stability. (Author)

AD-294 865 Div. 30, 22, 19
(TISTW/PCR) OTS price $2.60

Ordnance Research Lab., Pennsylvania State U., University Park.
A DIGITAL SYSTEM FOR DATA COLLECTION, REDUCTION,

AND ANALYSIS,
by F. P. Finlon. 15 Jan 63, 9p. illus. (Serial no. 16597-93)
(Contract NOrd-16597)
Unclassified report

DESCRIPTORS: *Data processing systems, *Analog-to-digital converters, Digital recording systems, Analog systems, Recording devices, Analysis, Torpedoes, Digital computers, Voltage, Power supplies, Programming, Photographs, Torpedo data computers, Digital systems, Miniature electronic equipment.

The Ordnance Research Laboratory has developed equipment and facilities to record, reduce, and analyze test data. The data-recording system converts the data from 45 analog signal sources to digital form and records the digital data on tape. The equipment is small enough to be installed in a torpedo. The field data-reduction system permits in-the-field evaluation of the test data. The laboratory data-reduction system includes a general-purpose digital computer. Both the present and projected capabilities of this system are described. (Author)

AD-294 872 Div. 30, 32
(TISTW/PCR) OTS price $8.10

System Development Corp., Santa Monica, Calif.
THE MARK I BUSINESS SYSTEM SIMULATION MODEL,
by J. Kagdis. 1 Dec 62, 86p. incl. illus. tables (Technical memo. TM-708/200/00)
Unclassified report

DESCRIPTORS: *Commerce, *Mathematical computer data, Computers, Programming, Simulation, Engineering, Warehouses, Personnel, Handbooks, Economics, Model tests.

In 1959 the System Development Corporation undertook a research program in management control systems. The research centered around the development of a large-scale business simulation model as a vehicle for doing research in management controls. The major results of the program were the development of the Mark I business simulation model and the Simulation Package (SIMPAC). SIMPAC is a method and set of programs facilitating the construction of large simulation models. The object of this document is to describe the Mark I Corporation model, state why parts of the business were modeled as they were, and indicate the research applications of the model. (Author)

AD-294 873 Div. 30
(TISTP/JW) OTS price $19.75

System Development Corp., Santa Monica, Calif.
PHASE 2 OF THE PHILCO 2000 JOVIAL TRANSLATOR.
22 Aug 62, 326p. incl. illus. (Technical memo. no. TM-555/212/00)
Unclassified report

DESCRIPTORS: *Machines, *Programming, Handbook, Language, Coding, Computers, Translations, Maintenance.

This document describes TRN2, the instruction generation portion of the Philco 2000 JOVIAL translator. It includes a general over-all description of the translator, but is written primarily as a document for a maintenance programmer. In addition to this document, the maintenance programmer would need a JOVIAL listing of TRN2, set-used and entered-from information, and a code-edit of the assembled program. The detailed descriptions of the translator regions and procedures are given in the same order as in the JOVIAL program. (Author)

AD-294 875 Div. 30, 24
(TISTA/GEC) OTS price $3.60

American Brake Shoe Co., Los Angeles, Calif.
THE DEVELOPMENT OF A PHOTOMEMORY.
Final rept., 15 Aug 58-15 Aug 62,
by Carl G. Blanyer. 15 Aug 62, 30p. illus.
(Contract Nonr-266800, Proj. NR 048-136)
Unclassified report

DESCRIPTORS: *Memory devices, *Data processing systems, Data storage systems, Photographic films, Digital systems, Semiconductors, Design, Photoelectric materials, Digital computers, Photoelectric cells, Reading machines.

Indexing methods for a store of photomemory type were explored, and basic planning for experimental reading and writing hardware was performed. A versatile test bed incorporating a commercial photographic enlarger was assembled. Successful reading and writing experiments were carried out. A demonstration reader capable of simple logical operations was developed. Writing of simple patterns with the apparatus was achieved. A complete small-scale reader designated the computer input device was designed, built, and tested. The investigation revealed that the concept is adaptable to practical equipment. Photocells are the limiting items in a reader design, and light sources and recording media the most significant in writing. The degree to which potential performance is realized depends on the uniformity of light signals during scanning, and the effectiveness of distortion correction and alignment techniques. (Author)

AD-294 878 Div. 30, 25
(TISTW/JEA) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
A SURVEY OF BUCKLING THEORY AND EXPERIMENT FOR CIRCULAR CONICAL SHELLS OF CONSTANT THICKNESS,
by Paul Seide. 12 Nov 62, 33p. incl. illus. table, 61 refs. (Rept. no. TDR-169(3560-30)TN-1)
(Contract AF 04(695)169)
(SSD TDR-62-188) Unclassified report

DESCRIPTORS: *Conical bodies, *Structural shells, Elastic shells, Structures, Compression shock, Pressure, Curved profiles, Hydrostatic pressure, Cylindrical bodies, Thickness, Bibliography, Torque, Compressible flow, Deflection, Experimental data, Torsiographs, Stabilization systems, Axially symmetric flow, Guided missile noses, Stability, Deformation, Theory, Buckling.

A survey of the state-of-the-art for the stability of thin-walled conical shells is presented. Known theoretical results are summarized and compared with experiment. The shortcomings of present knowledge and recommended work for the future are discussed. (Author)

AD-294 879 Div. 30, 2
(TISTM/ODN) OTS price $7.60

Technical Library, Camp Detrick, Frederick, Md.
BIBLIOGRAPHY ON METHODS OF SAMPLING AIRBORNE PARTICLES.
1 Aug 53, 73p. refs.
Unclassified report

DESCRIPTORS: *Bibliography, *Air, *Particles, Atmosphere, Contamination, Volcanic dust, Sampling.

This bibliography contains journal references covering the years from about 1930 to June, 1953, and a few earlier references. Main sources of the references were Bulletin of Hygiene,

Chemical Abstracts, Industrial Arts Index, and the bibliographies in many of the articles themselves. The subject matter covers only methods of sampling airborne particles; no attempt was made to include subjects such as air cleaning or particle size analysis. Reference is made to abstracts in Chemical Abstracts and the Bulletin of Hygiene in many cases where the original paper is not in the Camp Detrick Technical Library. The references are divided into ten subject groupings and one title is repeated under as many groups as seemed appropriate. Since many of the titles are not in the Camp Detrick Technical Library, classification of those titles under the subject groups was based only on the title of the paper; in some cases where no clue at all was available as to the type of sampler discussed in the paper, it was placed at the end in the miscellaneous group. It is not claimed that this is a complete bibliography for the years covered, but it is hoped that no serious ommissions have occurred. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-294 827 Div. 31, 17
(TISTM/SJR) OTS price $2.25

Battelle Memorial Inst., Columbus, Ohio.
THE EFFECT OE METALLURGICAL VARIABLES IN SHIP-PLATE STEELS ON THE TRANSITION TEMPERATURES IN THE DROP-WEIGHT AND CHARPY V-NOTCH TESTS.
Rept. on Proj. SR-151,
by F. W. Boulger and W. R. Hansen. 3 Dec 62, 74p. incl. illus. tables (Serial no. SSC-145) (Contract NObs-77113; In cooperation with Committee on Ship Structure, National Research Council, Washington, D. C., Contract NObs-84321)
Unclassified report

DESCRIPTORS: *Ship plates, *Metallurgy, *Steel, *Metallurgical analysis, *Transition temperature, Crystal structure, Grains (Metallurgy), Microscopy, Ferrites, Pearlite, Aluminum alloys, Carbon alloys, Manganese alloys, Silicon alloys, Tensile properties, Mechanical properties, Fracture (Mechanics), Test methods.

The effects of composition and ferrite grain size on drop-weight transition temperatures were studied. To provide an internal check and to permit comparisons with other investigations, parallel studies were made on V-Notch Charpy specimens. The experimental steels covered the following ranges in composition: 0.10/0.32% carbon, 0.30/1.31% manganese, 0.02/0.43% silicon, and nil/0.136% acid soluble aluminum. These ranges were intentionally wider than the limits permitted for ship plate. Although most of the data were obtained on hot-rolled samples, some plates were heat treated in order to cover a wider range in ferrite grain size. The study showed that carbon raises and manganese, silicon, aluminum and finer ferrite grain sizes lower both drop-weight and Charpy transition temperatures. Quantitatively, variations in composition and grain size have a more marked effect on Charpy transition temperatures than on the drop-weight transition temperature. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-293 822 Div. 32, 14, 17, 25
(TISTM/ODN) OTS price $1.10

Martin-Marietta Corp., Denver, Colo.
HEAT CONDUCTION IN SOLIDS. A BIBLIOGRAPHY 1958-1962,
by Clyde Briggs. 1962, 7p. (Literature search no. 22)
Unclassified report

DESCRIPTORS: *Bibliography, *Solids, Heat transfer, Materials, Metals, Temperature, Refractory materials, Thermal conductivity.

AD-293 824 Div. 32, 10
(TISTM/ODN) OTS price $1.10

Martin Marietta Corp., Denver, Colo.
BIBLIOGRAPHY ON THIXOTROPIC AND JELLED PROPELLANTS AND FLUIDS,
by Clyde Briggs. 25 Apr 62, 2p. refs. (Literature search no. 14)
Unclassified report

DESCRIPTORS: *Bibliography, *Propellants, *Gels, *Fluids, Colloids, Fuels, Combustion, Encapsulation.

AD-293 900 Div. 32, 1, 27
(TISTA/GEC) OTS price $3.60

Boeing Co., Seattle, Wash.
KWIC INDEX OF TRANSPORT DIVISION TECHNICAL STAFF REPORTS.
Report for 1 Jan-31 Dec 61.
Dec 62, 36p. (Document no. D6-4187)
Unclassified report

DESCRIPTORS: *Scientific research, *Indexes, Management engineering, Aerodynamics, Mechanical engineering, Transport planes, Turbojet engines, Jet planes.

AD-294 319 Div. 32
(TISTP/JW) OTS price $1.10

RAND Corp., Santa Monica, Calif.
THAILAND -- 1962,
by David A. Wilson. Dec 62, 8p. 6 refs. (Rept. no. P-2685)
Unclassified report

DESCRIPTORS: *Thailand, Political science, Economic conditons.

1962 was the year of the northeast in Thailand. The course of public affairs was dominated by the shifting winds to the east in the successor states to French Indochina. Within these affairs the possibility of profound changes in both the internal and external politics of the kingdom may be perceived. The authoritarian regime of Field Marshal Sarit Thanarat, established in early 1959, continued to maintain firm control over the country. The tendency to centralize may of the important institutions of information, propaganda, education and control under the direct supervision of the Prime Minister continued. The sum effect was to hold political conflict in a state of suspense. The deliberations of the appointed constituent assembly proceeded at a measured pace and it is only by the logic of passing time that a new permanent constitution drew any nearer. (Author)

AD-294 859 Div. 32
(TISTB/DGH) OTS price $3.60

Documentation, Inc., Bethesda, Md.
INDEXING AIDS.
Final rept.,
by Vladimir Slamecka. Jan 63, 33p. refs.
(Contract AF 30(602)2616, Proj. 4594)
(RADC TDR 62-579)
Unclassified report

DESCRIPTORS: *Indexes, Determination, Standardization, Selection, Theory, Analysis, Feedback, Reliability.

Classification schedules, alphabetical vocabularies, and concept-association lists are analyzed from the viewpoint of their utility in coordinate indexing as aids prescribing invariable relationships and suggesting variable relationships among indexing terms. Look-up and feedback devices are considered in relation to the indexer consistency. A research methodology for testing the effect of indexing aids on the reliability of indexers is outlined. (Author)

33. TRANSPORTATION

AD-294 360 Div. 33, 7
(TISTE/CRJ) OTS price $1.25

Engelhard Industries, Inc., East Newark, N. J.
PRELIMINARY INVESTIGATION FOR WIRELESS CONTROL SYSTEM FOR AIRPORT LIGHTING.
Final rept.
12 July 62, 50p. incl. illus. tables.
(Contract ARDS-494)
Unclassified report

DESCRIPTORS: *Airports, *Lighting systems, *Lighting equipment, *Remote control systems, Monitors, Control systems, Signal-to-noise ratio, Underground structures, Antennas.

Efforts were made to demonstrate the feasibility of using low frequency, low power electrical energy impressed upon short length antenna buried in the earth for the remote control of airport lighting equipment. An equation was established relating the received signal, transmitted power and frequency, soil resistivity, antenna length and distance. In the tests conducted, transmission over distances up to 1 mile have been obtained. Various factors affect the successful transmission of these signals and the following are of particular importance. (a) Placement of receiving and transmitting electrodes at a depth or orientation where surface discontinuities do not reduce the transmission; and (b) Elimination of the effect of extraneous signals upon the receiver, in particular, 60 c signals. The equation established by the tests conducted involves very large power and very long antenna for transmission at 5 miles, since the reduction of signal as a factor of 1/R to the 3rd power becomes great. (Author)

AD-294 581 Div. 33
(TISTP/JW) OTS price $2.60

RAND Corp., Santa Monica, Calif.
DECREASING TRAVEL TIME FOR FREEWAY USERS,
by R. H. Haase. Oct 62, 25p. incl. illus. 5 refs.
(Memo. no. RM-3099-FF)
Unclassified report

DESCRIPTORS: *Traffic, *Transportation, Roads, Analysis, Density, Motion, Management engineering, Control systems.

A follow-the-leader model of traffic flow is employed to investigate possible methods of increasing the utility of freeways. The criterion used is that of minimizing trip travel time, since this is the motorist's primary objective, rather than maximizing flow. An idealized model of typical freeway trip shows that travel time may be reduced by maintaining the density of cars below a critical level. This can be accomplished by restricting the flow of cars onto the freeway and by maintaining off-ramp capacity in excess of on-ramp capacity. The study also suggests for further analysis three technical developments that may increase the utility of freeways: an effective integrated control system to regulate the density of automobiles on the freeway network, a practical method for automatic lane reversal, and an efficient, fast method for removal of obstructions on the freeway. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

Descriptors marked with an asterik are included in the subject index.

ASTRONOMY

NASA N63-10997 $1.60

Space Sciences Lab., U. of California, Berkeley.
A POSSIBLE ORIGIN OF THE LUNAR WALLED PLAIN PTOLEMAEUS, by Robert G. Strom and A. Fahn. Rept. on Grant NsG-145-61. 15 Oct 62, 15p. 18 refs. Series no. 3, issue no. 24.

Astrophysics

NASA N63-12115 $5.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOG OF PRECISELY REDUCED OBSERVATIONS NO. P-6, by Jean E. MacDonald. Rept. on Grant NsG-87-60. 10 Spe 62, 52p. 4 refs. Special rept. no. 104.

NASA N63-12116 $3.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOG OF PRECISELY REDUCED OBSERVATIONS NO. P-7, by Phyllis Stern. Rept. on Grant NsG-87-60. 1 Nov 62, 40p. 3 refs. Special rept. no. 106.

NASA N63-12117 $1.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
ON SOME SINGULAR ORBITS OF AN EARTH-SATELLITE WITH A HIGH AREA-MASS RATIO, by G. Colombo and D. A. Lautman. Rept. on Grant NsG-87-60. 9 Nov 62, 17p. 4 refs. Special rept. no. 107.

NASA N63-12118 $1.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
ON THE LIBRATION ORBITS OF A PARTICLE NEAR THE TRIANGULAR POINT IN THE SEMIRESTRICTED THREE-BODY PROBLEM, by G. Colombo, D. Lautman, and C. Munford. Rept. on Grant NsG-87-60. 1962, 12p 1 ref. Special rept. no. 108.

NASA N63-10642 $4.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
OPTICAL SATELLITE TRACKING PROGRAM, by Fred L. Whipple. Semi-annual progress rept. no. 6, 1 Jan-30 June 62, on Grant NsG-87-60. 1962, 48p. 28 refs. June 62, on Grant NsG-87-60. 1962, 48p. 28 refs.

NASA N63-12082 $1.10

California Inst. of Tech., Pasadena.
INTERPLANETARY MAGNETIC FIELDS: PRELIMINARY MARINER II OBSERVATIONS, by Leverett Davis, Jr., P. J. Coleman and others. Rept. on Grants NsG-151-61, NsG-249-62, and Contract NASw-6. [1962] 9p. 8 refs.

NASA N63-11322 $4.60

Rand Corp., Santa Monica, Calif.
THE STUDY OF PLANETARY ATMOSPHERES BY STELLAR OCCULATION, by H. L. Weisberg. Rept. on Contract NAS7-100. Oct 62, 47p. 11 refs. Memo RM-3279-JPL.

NASA N63-11562 $26.00

Space Science Board, National Research Council, Washington, D. C.
A REVIEW OF SPACE RESEARCH, by H. H. Hess and others. 1962, 584p. 16 refs. Publication no. 1079.

Report of the Summer Study conducted at the State University of Iowa, Iowa City, June 17-Aug 10, 1962.

BEHAVIORAL SCIENCES

Human Engineering

PB 162 784 $4.60

Indiana U., Bloomington.
FREQUENCY RESPONSES OF HUMAN OPERATORS FOLLOWING A SINE WAVE INPUT, by Douglas G. Ellson and Florence E. Gray. Rept. no. 14 on Contract W33-038-ac-13968. Sep 48, 41p. 2 refs. Serial no. MCREXD-694-2N; ATI-52 939.

DESCRIPTORS: *Human engineering, Frequency, Amplitude modulation, Phase modulation, Conditioned reflex, Motor reactions, *Psychomotor tests.

The purpose of the experiment was to test the linearity of the human operator in a tracking situation by determining the amplitude and phase shift of the response of human operators when they attempted to follow a sine form movement at various frequencies with variations in amplitude of input (pointer movement) and amount of operator response required to produce output movement. (Author)

PB 162 503 $5.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
THE EFFECTS OF CONTROLLING THE SEARCH PATTERN OF A PHOTOINTERPRETER, by Glenn A. Fry and Clark A. Townsend. Rept. on [Human Aspects of Photographic Interpretation] Contract AF 30(602)1580. Sep 59, 54p. 8 refs. Technical paper no. (696)-23; RADC-TN-59-353; AD-232 128.

DESCRIPTORS: *Optical systems, Display systems, *Photographic analysis, Photographic equipment, Photographic intelligence, *Map reading.

A boustrophedon scanning pattern is described. The scanning movements in this type pattern are along paths from right to left and then left to right, starting at the top or bottom of the photograph, and moving progressively upward or downward from one sweep to the next. Photographic records of eye movements show that photointerpreters can follow a marker or can hold their eyes reasonably steady while the photograph jumps across the field of view. Subjects prefer the moving marker and this method of scanning appears to give fewer errors. Machine generated search patterns which give complete and uniform coverage are useful primarily when the targets are hard to find. Under conditions of good visibility, free search is much to be prefered. Under these conditions, peripheral vision is more effective and tests show that on the average free search represents a faster way of finding the target. Various devices for controlling search patterns were designed and are described. (Author)

PB 162 504 $5.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
THE RELATION OF BLUR AND GRAIN TO THE UPPER LIMIT OF USEFUL MAGNIFICATION, by Glen A. Fry. Rept. on [Human Aspects of Photographic Interpretation] Contract AF 30(602)1580. Sep 59, 57p. 4 refs. Technical paper (696)-22; RADC-TN-59-367; AD-239 099.

DESCRIPTORS: *Photogrphic film, Photographic enlargers, Optical images, Visual acuity, Illumination, Reproduction, Mapping, Photographic intelligence, Target recognition, Visibility.

An attempt was made to find out what magnification and viewing distances should be used by a photointerpreter. The upper limit of useful magnification is affected by both blur and grain in the photographic image. A distinction must be made between half-tone reproductions and photographic images under high magnification because in the latter case the randomness of the grain size, configuration, and spacing eliminates the possibility of detecting the presence of a border on the basis of grain pattern. In the typical case there must be a difference in average luminance on the two sides of a border for the border to be visible. In the case of a straight border the more the magnification the less visible the border. In the case of curved or serrated borders of borders bounding areas like discs or rectangles, the upper limit of useful magnification represents a compromise between (1) the beneficial effect of length and reduced curvature and (2) the degrading effect of blur and grain upon the perception of a brightness difference. (Author)

NASA N63-10412 $8.60

Massachusetts Inst. of Tech., Cambridge.
TACTILE COMMUNICATIONS WITH AIR JETS, by Lester Saslow. Rept. on Grant NsG-107-61 and Contract SAV 1004-61. 30 Feb 62, 99p. 38 refs. Rept. nos. 8768-1 and 8649-1.

Psychology

PB 158 963 $7.60

Harvard U. Medical School, Boston, Mass.
ANTISOCIAL BEHAVIOR AND HYPNOSIS: PROBLEMS OF CONTROL AND VALIDATION IN EMPIRICAL STUDIES, by Martin T. Orne. Rept. on Studies in Hypnosis Project, Contract AF 49(638)728. [1961] 79p. 73 refs. AFOSR-1205.

DESCRIPTORS: Psychology, *Hypnosis, *Behavior, Personality, Control, *Adjustment (Psychology).

One of the oldest questions in the hypnotic literature is whether a deeply hypnotized individual can be induced to perform antisocial or self-destructive acts. This discussion reanalyzes the relevant issues in an attempt to provide a more systematic and meaningful content for re-examining the existing data. Such re-examination should suggest research approaches for an empirical resolution of the basic issues and, hopefully, will provide a basis for integrating some of the theoretical problems encountered in a study of hypnosis with broader aspects of the social sciences. (Author)

PB 158 964 $3.60

Harvard U. Medical School, Boston, Mass.
VALIDATION AND CROSS-VALIDATION OF A SCALE OF SELF-REPORTED PERSONAL EXPERIENCES WHICH PREDICTS HYPNOTIZABILITY, by Ronald E. Shor, Martin T Orne, and Donald W. O'Connell. Rept. on Studies in Hypnosis Project, Contract AF 49(638)728. [1961] 31p. 17 refs. AFOSR-1206.

DESCRIPTORS: Psychology, Tests, *Hypnosis, *Behavior, Personality, Education, *Reaction (Psychology).

A questionnaire was developed in an attempt to devise a measure independent of hypnotizability of cognitive ability factors which were hypothesized as components of hypnotizability. The results were a modestly convincing demonstration that the questionnaire as evolved is a predictor of hypnotizability, and most clearly so in the deepest region of the hypnotizability continuum. The findings are interpreted in terms of theoretical formulations where both ability factors and non-ability factors (such as attitudes and motives) are viewed as components of achieved hypnotizability. Ramifications are discussed and theoretical extrapolations from the data are presented as an aid and stimulant for further investigation. (Author)

BIOLOGICAL SCIENCES

LAMS-2780 $4.00

Los Alamos Scientific Lab., N. Mex.
BIOLOGICAL AND MEDICAL RESEARCH GROUP (H-4) OF THE HEALTH DIVISION. Annual rept. July 61-June 62, on Contract W-7405-eng-36. July 62, 317p. 225 refs. NASA N63-10589.

UR-622 $0.50

Rochester U. School of Medicine and Dentistry, N. Y.
POSSIBLE EFFECTS OF WEIGHTLESSNESS ON CALCIUM METABOLISM IN MAN, by William F. Neuman. Rept. on Contract W7405-eng-49. 10 Dec 62, 15p. 15 refs.

Anatomy and Physiology

NASA N63-12236 $2.60

Cedars of Lebanon Hospital, Los Angeles, Calif.
MEASUREMENT OF PRE-EJECTION AND EJECTION-CONTRACTION TIME BY THE VIBROCARDIOGRAM, by Clarence M. Agress, Stanley Wegner, and Daniel J. Bleifer. Rept. on Grant NsG-289-62. 1962, 22p. 25 refs.

PB 162 771 $21.00

Institute of science and Tech., U. of Michigan, Ann Arbor.
VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD DATA TABLES, by E. Rae Harcum. Rept. on Proj. Michigan, Contract DA 36-039-sc-52654. Mar 60, 398p. 2144-432-R; AD-233 114

DESCRIPTORS: Tables, *Visual perception, Retina, *Vision, *Target recognition.

Included in the rept. are:
Patterns of blackened circles in an eight-circle template, by E. R. Harcum. Rept. no. 2144-294-T
Nine-element typewritten targets, by E. R. Harcum. Rept. no. 2144-293-T
Patterns of solid circles and squares, by E. R. Harcum and A. Rabe. Rept. no. 2144-306-T
Linear binary patterns at thirty-six orientations, by E. R. Harcum and A. Rabe. Rept. no. 2144-296-T
Identification of the number of blackened circles, by E. R. Harcum and R. E. Blackwell. Rept. no. 2144-314-T
Eight-element and ten-element binary patterns, by E. R. Harcum. Rept. no. 2144-303-T
Effect of target length measured in angular units, by E. R. Harcum. Rept. no. 2144-304-T
Binary patterns along twelve meridians, by E. R. Harcum. Rept. no. 2144-302-T
Binary patterns of the letters "H" and "O", by E. R. Harcum. Rept. no. 2144-308-T
Monocular and binocular recognition of patterns of squares and circles, by E. R. Harcum. Rept. no. 2144-307-T
Acuity for open and blackened circles, by E. R. Harcum. Rept. no. 2144-315-T
Linear binary pattern at known eccentricities, by E. R. Harcum. Rept. no. 2144-316-T (See also PB 142 791)

NASA N63-11426 $1.60

St. Louis U., Mo.
ACTIVE ABSORPTION OF D-GLUCOSE BY INTESTINAL SEGMENTS OF THE GROUND SQUIRREL, CITELLUS TRIDECEMLINEATUS, by X. J. Musacchia and S. S. Neff. Rept. on Grant NsG-271-62. 1962, 12p. 14 refs.

Biochemistry

NASA N63-11402 $2.60

Institute for Space Biosciences, Florida State U., Tallahassee.
EXPERIMENTS SUGGESTING ORIGINS OF AMINO ACIDS AND PROTEINS, by Sidney W. Fox. Rept. on Grants NsG-173-62 and C-3971. 1962, 24p. 36 refs. Contribution no. 6.

UCRL-10350 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
BIO-ORGANIC CHEMISTRY. Quarterly rept. Mar-May 62, on Contract W-7405-eng-48. 5 July 62, 92p. 102 refs. NASA N62-17414.

UCRL-10479 $1.25

Lawrence Radiation Lab., U. of California, Berkeley.
BIO-ORGANIC CHEMISTRY. Quarterly rept. June-Aug 62, on Contract W7405-eng-48. 26 Sep 62, 55p. 67 refs.

Microbiology

NASA N63-11326 $1.60

Institute for Space Biosciences, Florida State U. Tallahassee.
EFFECTS OF THE GRAM STAIN ON MICROSPHERES FROM THERMAL POLYAMINO ACIDS, by Sidney W. Fox and Shuhei Yuyama. Rept. on Grants NsG-173-62 and C-3971(04). 1962, 18p. 2 refs.

Presented at the Conference on Problems of Environmental Control on the Morphology of Fossil and Recent Protobionta at the N. Y. Academy of Sciences, May 1, 1962.

NASA N63-11000 $5.60

Minnesota U., Minneapolis.
CONTINUOUS PROPAGATION OF MICROORGANISMS, by A. G. Fredrickson and H. M. Tsuchiya. Rept. on Grant NsG-79-60. 10 Aug 62, 53p. 27 refs.

Radiobiology

TID-3909(Suppl.) $0.75

Atomic Energy Commission. Div. of Biology and Medicine, Washington, D. C.
AN ATOMIC RADIATION BIBLIOGRAPHY. A LIST OF REPORTS SUBMITTED TO THE UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION (SUPPLEMENT) comp. by Alfred W. Klement, Jr. 15 May 62, 31p. NASA N63-NASA N63-10605.

UCSF-22 $2.00

California U., San Francisco. School of Medicine.
RADIOLOGICAL LABORATORY. Progress rept. for period ending 30 Sep 62, on Contract AT(11-1)-GEN-10. 30 Sep 62, 70p. 29 refs.

HW-74969 $0.50

Hanford Atomic Products Operation, Richland, Wash.
REPRODUCTIVE PERFORMANCE OF MINIATURE SWINE INGESTING STRONTIUM-90 DAILY, by R. O. McClellan, M. E. Kerr, and L. K. Bustad. Rept on Contract AT(45-1)1350. 20 Sep 62, 8p. 4 refs.

CHEMISTRY

TID-7643 $5.00

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON RADIATION-INDUCED POLYMERIZATION AND GRAFT COPOLYMERIZATION. Held at Battelle Memorial Institute, November 29-30, 1962. Nov 62, 418p. 302 refs.

NAA-SR-7362 $0.75

Atomics International, Canoga Park, Calif.
DEVELOPMENT OF THE PYROLYTIC FOULING TEST FOR ORGANIC REACTOR COOLANTS, by P. R. Benson. Rept. on Contract AT(11-1)GEN-8. 30 Nov 62, 33p. 4 refs.

SCR-512 $2.25

New Mexico U., Albuquerque,
ISOTOPIC EXCHANGE REACTIONS, by Milton Kahn, Kenneth R. Applegate, and Bruce Erdal. Bibliography. May 62, 104p. 995 refs.

K-1533 $0.50

Oak Ridge Gaseous Diffusion Plant, Tenn.
CATALYTIC GAS PLATING WITH NICKEL CARBONYL by W. E. Tewes, T. E. Zava, and T. B. Hoover. Rept. on Contract W-7405-eng-26. 23 Nov 62, 30p. 7 refs. NASA N63-10585.

ORNL-3344 $1.00

Oak Ridge National Lab., Tenn.
FABRICATION AND ASSEMBLY OF A TEFLON DROPPING-MERCURY ELECTRODE, by Helen P. Raaen, R. J. Fox, and V. E. Walker. Rept. on Contract W7405-eng-26. 30 Nov 62, 36p. 9 refs. NASA N63-10867.

DP-772 $0.50

Savannah River Lab., Aiken, S. C.
A POLAROGRAPHIC TEST FOR SOLVENT QUALITY. PART II. POLAROGRAPHIC BEHAVIOR OF "ADAKANE" 12 - TRIBUTYL PHOSPHATE, by Robert C. Propst and John C. Simms. Rept. on Contract AT(07-2)-1. Sep 62, 12p. 3 refs.

PB 162 768 $2.60

Chemical Engineering Lab., Calif. Inst. of Tech., Pasadena.
EXPERIMENTAL MEASUREMENTS OF THE VOLUMETRIC AND PHASE BEHAVIOR OF MIXTURES OF NITRIC OXIDE AND NITROGEN DIOXIDE, by F. T. Selleck, H. H. Reamer, and B. H. Sage. Supplementary rept. to Volumetric and Phase Behavior of Mixtures of Nitric Oxide and Nitrogen, Dioxide. [Contract N6onr-244(12)]. Nov 52, 21p. 3 refs. AD-8046.

DESCRIPTORS: *Oxidizers, *Nitrogen compounds, Oxides, Dioxides, *Liquified gases, Phase studies, Volume, Temperature, Pressure, Dew point, Bubbles.

The volumetric characteristics were determined for $NO-NO_2$ mixtures between 40° and 340°F at pressures up to 7000 psi. A spherical isochoric steel vessel was employed in these experiments on the effect of temperature and pressure on the total sphere volume. The pressures, temperatures, and specific volumes are recorded for the mixtures. Data for the bubble-point and dew-point states were established from the discontinuities in the isochoric pressure-temperature derivative obtained from specific-volume data; the uncertainty in determining the bubble-point and dew-point states increased with proximity to the critical state of the mixture. (ASTIA abstract)

PB 162 767 $3.60

Chemical Engineering Lab., Calif. Inst. of Tech., Pasadena.
VOLUMETRIC AND PHASE BEHAVIOR OF MIXTURES OF NITRIC OXIDE AND NITROGEN DIOXIDE, by F. T. Selleck, H. H. Reamer, and B. H. Sage. Rept. on [Contract N6onr-244(12)]. [Nov 52] 38p. 19 refs. AD-8045.

DESCRIPTORS: *Oxidizers, *Nitrogen compounds, Oxides, Dioxides, *Liquified gases, Phase studies, Pressure, Temperature, Dew point, Bubbles.

The compositions of the coexisting phases of $NO-NO_2$ mixtures were established through the 2-phase region for temperatures above 70°F and for compositions containing over 80 wt-% NO_2. The specific volumes of the liquid and gas phases of the oxide mixtures were determined between 40° and 340°F at pressures up to 7000 psi The bubble-point pressures of the oxide mixtures containing up to 20 wt-% NO were below 300 psi at 160°F; the pressures were sufficiently low to permit the use of conventional storage and handling techniques under most climatic conditions. The specific volume changed almost linearly with isobaric-isothermal changes in composition in the liquid and gas phases; the results could be interpolated for desired composition. The data agreed with those on the volumetric and phase behavior of the pure components. (ASTIA abstract)

UCRL-10451 $1.75

Lawrence Radiation Lab., U. of California, Berkeley.
MATRIX ISOLATION STUDIES OF HIGH-TEMPERATURE SPECIES GROUP II CHLORIDES, by Raymond W. McNamee, Jr. Doctoral thesis. Rept. on Contract W7405-eng-48. 13 Sep 62, 76p. 32 refs.
NASA N63-10863.

IDO-14597 $0.50

Phillips Petroleum Co., Idaho Falls.
THERMAL DECOMPOSITION OF HYDRATED IRON, CHROMIUM, AND NICKEL NITRATES AND THEIR MIXTURES, by E. M. Vander Wall. Rept. on Contract AT(10-1)205. 26 Nov 62, 22p. 9 refs.

EARTH SCIENCES

AD-280 995 $7.60

Arctic Inst. of North America, Washington, D. C.
SOME BIOLOGICAL OCEANOGRAPHIC OBSERVATIONS IN THE CENTRAL NORTH POLAR SEA DRIFT STATION ALPHA, 1957-1958, by T. Saunders English. Scientific rept. no. 15 on Contract AF 19(604)3073. Apr 61, 76p. 38 refs. Research paper no. 13; AFCRL-652.

DESCRIPTORS: *Marine biology, Biology, *Oceanographic data, Hydrographic surveying, *Polar regions.

NASA N63-12034 $2.60

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
THE PHYSICAL SIGNIFICANCE AND APPLICATION OF L, B_O, AND R_O TO GEOMAGNETICALLY TRAPPED PARTICLES, by Edward C. Stone. Rept. on Grants NsG-179-61 and AF-AFOSR-62-23, and Contract AF 49(638)1008. Dec 62, 27p. 5 refs. EFINS-62-72.

HW-71400 (Vol. 2) $4.00

Hanford Atomic Products Operation, Richland, Wash.
THE GREEN GLOW DIFFUSION PROGRAM. VOLUME II, ed. by Morton L. Barad and James J. Fuquay. Rept. on Contract AT(45-1)1350. Apr 62, 309p. 72 refs. Geophysical research papers no. 73; AFCRL 62-251(II); NASA N62-17973.

PB 162 761 $6.60

IBM Federal Systems Div., Rockville, Md.
STUDY OF A DIGITAL METHOD FOR AN AUTOMATIC MAP COMPILATION SYSTEM. Final technical rept. for 1 Jan-31 July 60 on Contract DA 44-009-eng-4205. 31 July 60, 65p. AD-243 034.

DESCRIPTORS: *Mapping, Aerial photographs, *Data processing systems, Digital computers, Recording devices, Operation.

The feasibility of a digital method of automatic map compilation was studied. Automatic map compilation consists of automatically printing out of a corrected orthophoto map with contour lines and other designations from a pair of aerial stereo-photographs. Digital automatic map compilation was divided into three operations of scanning and digitizing photographs, pattern-matching, and recording or printing photomaps. (Author)

NASA N63-11323 $5.60

Iowa State U., Iowa City.
GEOPHYSICAL RESEARCH WITH SATELLITES INJUNS, I. II, AND III, by B. J. O'Brien. Rept. on Grant NsG-233-62. 1962, 51p. 13 refs. Paper no. 62-84; SUI-62-28.

Presented at a Joint Meeting of the American Astronautical Soc. and the American Assoc. for the Advancement of Science, Philadelphia, 27 Dec 62.

NASA N63-11888 $2.60

Iowa State U., Iowa City.
INTENSITY OF ELECTRONS IN THE EARTH'S INNER RADIATION ZONE, by L. A. Frank and J. A. Van Allen. Rept. on Grant NsG-233-62 and Contract N9onr-93803. Dec 62, 21p. 9 refs. SUI-62-27.

Physics of the Atmosphere

NASA N63-10168 $5.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
A METHOD OF DETERMINATION OF IONOSPHERIC ELECTRON DENSITY PROFILES FROM FARADAY ROTATION OF SATELLITE BORNE RADIO SIGNALS, by Victor Gonzalez. Doctoral thesis. Rept. on Grant NsG-24-59. Sep 62, 59p. 24 refs.

NASA N63-10460 $1.10

Institute of Geophysics and Planetary Physics, U. of California, Los Angeles.
IMPLICATIONS OF THE DISCOVERER XVII SATELLITE DATA: THE MECHANISM OF ATMOSPHERIC LOSS FROM THE EARTH AND THE PRODUCTION OF H^3 AND He^3 IN SOLAR FLARES, by E. Flamm, R. E. Lingenfelter and others. Rept. on Grants NsG-237-62, NsG-216-62, and NSF G-13575. [1962] 10p. 37 refs.

NASA N63-11324 $2.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
THE RECOMBINATION COEFFICIENT OF THE NIGHTTIME F LAYER, by John S. Nisbet and T. P. Quinn. Rept. on Grant NsG-134-61. 15 Jan 63, 28p. 21 refs. Scientific rept. no. 177.

NASA N63-12144 $4.60

Space Physics Research Lab., U. of Michigan, Ann Arbor.
THEORY AND IMPLEMENTATION OF THE PITOT-STATIC TECHNIQUE FOR UPPER ATMOSPHERIC MEASUREMENTS, by J. J. Horvath, R. W. Simmons, and L. H. Brace. Scientific rept. no. NS-1 on Contracts NASr-54(01) and AF 19(604)6124. Mar 62, 42p. 1 ref. ORA rept. 03554, 04673-1-S.

PB 159 308 $8.10

Upper Air Research Lab., U. of Utah, Salt Lake City.
AN UPWARD PULSE DELAY SYSTEM FOR MEASURING ELECTRON DENSITIES OF THE IONOSPHERE by Robert E. Watson. Scientific rept. no. 5 (Final) on Contract AF 19 (604)2227. 19 Dec 61, 87p. 21 refs. AFCRL-1022.

DESCRIPTORS: *Ionosphere, *Electron density, Measurement, *Radiofrequency pulses, Pulse transmitters, Upper atmosphere, Sounding rockets.

A system is described which measures the free electron content of the ionosphere by the transmission of rf pulses between a rocket, which is passing through the ionosphere, and the ground. The basic requirements and operation of the system as a whole are examined. The development and design of each of the component parts of the system are then discussed, including circuit diagrams and any important construction details. Special emphasis is placed on the design of a ground based low frequency pulsed transmitter. The design of a low frequency rocket-borne receiver also capable of operation from 4 mc to 12 mc is discussed in detail. A ground station for receiving and recording the pulses transmitted from the rocket is also described including the circuit design of the various units.

ENGINEERING

NASA N63-10951 $1.60

Astro Research Corp., Santa Barbara, Calif.
THEORETICAL AND EXPERIMENTAL STUDIES OF EXPANDABLE STRUCTURES, by H. U. Schuerch. Summary rept. on Contract NASr-8, amend. 1. 9 Oct 62, 13p. 6 refs. Rept. no. ARC-R-77.

NASA N63-10491 $10.10

Engineering Design Center, Case Inst. of Tech., Cleveland, Ohio.
DESIGN SYNTHESIS IN A MULTIDIMENSIONAL SPACE WITH AUTOMATED MATERIAL SELECTION, by Lucien A. Schmit, Jr. and Robert H. Mallett. Rept. on Grant NsG-110-61. Aug 62, 125p. 22 refs.

PB 162 770 $15.00

Hughes Aircraft Co., Culver City, Calif.
STUDY OF HYDROFOIL STABILITY AND CONTROL, by G. Chuck, R. K. C. Luke, and S. J. Scroggs. Final rept. on Contract NObs-78572. 29 Dec 60, 225p. 20 refs. Rept. no. SRS-399; AD-250 431.

DESCRIPTORS: *Hydrofoils, Stability, Control, *Hydrofoil boats, Design, Mathematical analysis.

A study was made of the longitudinal stability and control of hydrofoil-supported craft of the 110-long-ton weight class in both calm and disturbed seas. Configurations involve craft with all fully-submerged foils, all surface-piercing foils, and a hybrid foil arrangement. As a design aid, the effects of variation of major parameters such as foil spacing, aspect ratio, submergence, foil loading, etc., are illustrated. It is shown that autopilot stabilization of submerged-foil craft is required, and that functionally-similar autopilots can provide nearly identical characteristics in craft of widely-varying geometric configuration. While longitudinal stability of surface-piercing-foil craft in smooth water is no problem, rough-sea capabilities are more limited than those of submerged-foil craft. The necessity of considering the implications of congiguration on lateral as well as longitudinal stability with surface-piercing-foil craft is noted. (Author)

Aeronautical Engineering

NASA N63-10995 $21.00

Stanford U., Calif.
HEAT TRANSFER WITH LAMINAR FLOW IN CONCENTRIC ANNULI WITH CONSTANT HEAT FLUX AND SIMULTANEOUSLY DEVELOPING VELOCITY AND TEMPERATURE DISTRIBUTIONS, by H. S. Heaton, W. C. Reynolds, and W. M. Kays. Rept. on Grant NsG-52-60. 1 July 62, 386p. 50 refs. Rept. no AHT-5.

AD-293 236 repriced $2.25

Systems Technology, Inc., Inglewood, Calif.
HANDLING QUALITIES IN SINGLE-LOOP ROLL TRACKING TASKS: THEORY AND SIMULATOR EXPERIMENTS, by T. S. Durand and H. R. Jex. Rept. on Contract AF 33(616)7866. Nov 62, 89p. 18 refs. ASD-TDR-62-507.

DESCRIPTORS: *Aircraft, Handling, Roll, *Stability (Lateral), *Control systems, *Human engineering, Flight simulators, Control simulators,

The systems analysis theory of aircraft handling qualities is applied to the task of closed-loop compensatory roll tracking by ailerons alone, and exploratory experiments in a fixed-base simulator are used to verify and refine the theory. The key theoretical parameters evolved are: dominant closed-loop spiral roll mode frequency and damping ratio; average Dutch roll frequency; Dutch roll frequency ratio; uncompensated closed-loop Dutch roll damping ratio; and Dutch roll phase dip. The simulator results corroborated the theory and give specific values for the variation in ratings and performance with these parameters. (Author) (See also AD-282 879)

Chemical Engineering

PB 181 470 $3.00

Bechtel Corp., San Francisco, Calif.
A STUDY OF LARGE SIZE SALINE WATER CONVERSION PLANTS. Rept. on Contract OSW 14-01-0001-267 Mar 63, 159p. Saline Water Conversion progress rept. no. 72.

DESCRIPTORS: *Sea water, *Desalination, Electrodialysis, *Distilling plants, Design, Costs, Economics, Water.

The effect of plant size on the costs of producing fresh water from saline (and brackish) sources was investigated. The scope of these studies included the three demonstration plants now in operation, namely, the Long Tube Vertical Multiple Effect Evaporation (LTV) process at Freeport, Texas, the Multi-stage Flash Evaporation (M-SF) process at (Point Loma) San Diego, California, and the Electrodialysis (E/D) process at Webster, South Dakota.

PB 181 469 $6.00

Chance Vought Corp., Dallas, Tex.
UTILIZATION OF ISOTOPES FOR SALINE WATER CONVERSION. Rept. for period ending 30 Sep 61 on Contract OSW 14-01-001-210. Dec 62, 410p. 60 refs. Saline Water Research and Development progress rept. no. 68.

DESCRIPTORS: *Sea water, *Desalination, Heat, Sources, *Nuclear energy, *Radioactive isotopes, Feasibility studies, Economics, Radioactive waste disposal, Fission products, Reactor fuel elements, Power reactors, Promethium, Cesium, Cerium, Strontium, Ruthenium, Isotopes, Water.

This report covers a study involving the use of radioisotope power as a heat source for saline water conversion. Section I deals with an economic feasibility study on this type of energy. The most economical source appears to be from the calcined fission product waste from processed spent reactor fuel elements. The results indicated that, for special conditions, this source of heat is competitive with conventional fuels. Section II presents the results of various studies on compatibility, thermodynamics, nuclear, and materials aspects of a full scale heater utilizing calcined radioisotope waste products. These studies have permitted the conceptual design of a nuclear heater capable of supplying the thermal requirements for a one million gallon per day saline water conversion operating at 200 kwh/1000 gal. Section III covers the design of a laboratory test model based on the data of Section II. This model will be capable of producing 250 gallons per day using one megacurie of cerium 144 and a six stage flash evaporation conversion unit. Also included is a hazards analysis of the test model. (Author)

Electrical and Electronic Engineering

PB 162 782 $1.60

[Army Electronics Research and Development Lab.] Fort Monmouth, N. J.
MEASUREMENT OF FILTER INSPECTION LOSS AT HIGH AND ULTRA HIGH FREQUENCIES, by Scott L. Shive. 22 Sep 50, 15p. Rept. no. M-1328; ATI-90 633.

DESCRIPTORS: Radio interference, Suppressors, *Filters (Electromagnetic wave), Electric filters, High frequency, Ultra high frequency, Radiofrequency filters.

This report discusses the fundamental principles of filter evaluation in terms of insertion loss measurement, points out the techniques and procedures evolved at this Laboratory by which relatively accurate and meaningful data at ultra high frequencies are obtained, and indicates the philosophy on which some of the measurement concepts are based. (Author)

PB 162 781 $14.00

[Army Signal Missile Support Agency] White Sands [Missile Range] N. Mex.
STOCHASTIC PROCESSES IN ENGINEERING PROBLEMS, by K. S. Miller. Aug 53, 201p. 19 refs. Technical rept. no. 6; AD-48 063.

DESCRIPTORS: *Electrical engineering, Engineering, *Noise (Radio), Information theory, *Statistical processes, Probability, Series, Statistical distributions.

Contents:
Analysis of time series
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Borel sets
Fourier series
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Hermite polynomials
Jacobians
Delta function

PB 162 720 $2.60

Inland Testing Labs., Morton Grove, Ill.
DETERMINATION OF DIELECTRIC STRENGTH CHARACTERISTICS OF PAPER-MYLAR CAPACITORS. Final rept. on Electronic Parts Evaluation, Subtask V, Contract DA 36-039-sc-73060. July 58, 25p. AD-242 870.

DESCRIPTORS: *Paper capacitors, *Capacitors, Dielectrics, *Dielectric properties, Temperature, Voltage, Statistical analysis, Electric insulation, Measurement, Tests, Polyethylene plastics.

The purpose of this study was to determine the dielectric strength characteristics of paper-mylar capacitors. The products of three manufactures in types designated as CPM08A3KE474K and CPM08A3KC684K, were tested at temperatures of 25° and 125°C. Charts are appended showing the distribution of breakdown voltage for 25 units

from each maker, in terms of $\bar{x} \pm 2$ standard deviations. (Author) (See also PB 162 719)

PB 162 717 $1.60

Inland Testing Labs., Morton Grove, Ill.
DETERMINATION OF TEMPERATURE CHARACTERISTICS OF PAPER-MYLAR CAPACITORS. Final rept. on Electronic Parts Evaluation, Subtask II, Contract DA 36-039-sc-73060. June 58, 20p. AD-242 875.

DESCRIPTORS: Paper capacitors, *Capacitors, Temperature, Electric insulation, Tests, Dielectrics, Military requirements, Polyethylene plastics.

The products of three manufacturers were tested at temperatures ranging from -55 to +125°C to determine the temperature characteristics of paper-mylar capacitors. Curves are appended showing the average of 25 units from each maker, for variations of capacitance, dissipation factor, and insulation resistance, in terms of percent change with reference to values at 25°C. (Author)

PB 162 718 $1.60

Inland Testing Labs., Morton Grove, Ill.
EXTENDED MOISTURE RESISTANCE TEST OF PAPER-MYLAR CAPACITORS, by J. Wayne Hamman. Final rept. on Electronic Parts Evaluation, Subtask III, Contract DA 36-039-sc-73060. Sep 59, 18p. AD-242 876.

DESCRIPTORS: Paper capacitors, *Capacitors, Moistureproofing, Tests, Electric insulation, Moisture, Dielectrics, Polyethylene plastics.

Paper-mylar capacitors, manufactured by three vendors, were subjected to 50 cycles of the moisture resistance test specified in MIL-C-14157 (Sig C); the subcycle phase was omitted from 30 cycles of the test. Test results from 225 units are given. Two failures occurred during the test: (1) the lead on one unit corroded and broke; and (2) one unit became erratic, electrically. (Author) (See also PB 162 717)

PB 162 719 $1.60

Inland Testing Labs., Morton Grove, Ill.
EXTENDED VIBRATION TESTS OF PAPER-MYLAR CAPACITORS, by J. Wayne Hamman. Final rept. on Electronic Parts Evaluation, Subtask IV, Contract DA 36-039-sc-73060. July 59, 18p. AD-242 873.

DESCRIPTORS: *Paper capacitors, Capacitors, Vibration, Tests, Temperature, Military requirements, Dielectrics, Dielectric properties, Polyethylene plastics.

Extended vibration tests were conducted on paper-mylar capacitors produced by three manufacturers. Seventy-two units were tested at each of two temperatures, 25°C and 125°C. Units at 25°C were vibrated at accelerations of 10G, 20G and 30G. Units at 125°C were vibrated only at a 30G level of acceleration. The frequency was varied from 55 to 2000 cycles per second on all units. The time and nature of each failure has been presented. (Author) (See also PB 162 718)

PB 162 712 $1.10

Inland Testing Labs., Morton Grove, Ill.
SHOCK TEST TO FAILURE OF PAPER-MYLAR CAPACITORS, by J. Wayne Hamman. Final rept. on Electronic Parts Evaluation, Subtask VI, Contract DA 36-039-sc-73060. July 59, 10p. AD-242 872.

DESCRIPTORS: *Paper capacitors, Capacitors, Tests, *Impact shock, Polyethylene plastics.

Paper-mylar capacitors, manufactured by three vendors, were subjected to shock at increasingly higher G-levels up to 700G in an effort to determine a threshhold of breakdown. Test results from 72 units are given. No catastrophic failures resulted. (Author) (See also PB 162 720)

PB 162 783 $8.10

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED, HIGH STABILITY, INSULATED (IMPROVED JAN-R-11 TYPES), by Sidney J. Stein. Quarterly progress rept. no. 2, 1 Oct 51-1 Jan 52, on Contract DA 36-039-sc-15332. [1952] 83p. 3 refs. ATI-135 364.

DESCRIPTORS: *Resistors, *Fixed resistors, Design, Manufacturing methods, *Metal films, *Nickel compounds, *Molybdenum compounds, Tungsten compounds, *Carbonyl radicals, X-ray diffraction analysis, Colorimetry, *Filaments, Glass, Drawing (Machine processing), Metal coatings, Carbon, Germanium, Deposits, *Electric terminals, Moistureproofing, Halocarbon plastics, *Electric furnaces.

The investigation of materials and methods believed to be capable of leading to low cost, insulated, fixed resistors of high stability was continued. An apparatus for the application of termination bands has been built and operated with moderate success. Analytical procedures have been developed for nickel and molybdenum which have yielded valuable information. Several electric furnaces have been made and evaluated for Vycor drawing. Some progress has been made towards the development of a suitable moisture-proof seal for resistor leads, particularly with the Kel-F to metal seal. The thermodynamics of the decomposition of metal carbonyls has been treated theoretically. (Author)

UCRL-7031 $0.50

Lawrence Radiation Lab., U. of California, Livermore.
DESIGN AND CONSTRUCTION FEATURES OF A VARIABLE GAP THERMIONIC CONVERTER TUBE, by W. H. Gust and E. S. McKee. Rept. on Contract W7405-eng-48. 27 Sep 62, 11p. 1 ref. NASA N63-10548.

PB 162 714 $3.60

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Michael B. Maccarone. Quarterly progress rept. no. 1, 1 Aug-30 Nov 54, on Shaft Seal, Rotary, Contract DA 36-039-sc-64476, continuation of Contract W36-039-sc-44520. [1954] 39p. AD-56 036.

DESCRIPTORS: *Antennas, *Wave guides, Coaxial cables, Joints, Seals, *Rotary seals, Design, Theory, *Magnetic materials.

A general approach to the development investigation will be along the following lines. The design of the magnetic seal basically will consist of a chamber containing a magnetic slurry in the presence of a magnetic field. The design of the magnetic chamber and the type of magnetic slurry that will be used will be determined empirically through experimental tests that will be conducted in the initial part of the investigation. Once the various parameters can be established and individualized as extensively as is needed a basic magnetic seal design will have been determined. This seal will necessarily have physical and mechanical problems which will have to be eliminated. The refinement of the basic experimental seal will establish the necessary design information which can later be applied in a practical method to the design of magnetically sealed rotary joints for the R. G. 48/U and R. G. 51/U waveguides. (Author)

PB 162 715 $4.60

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Michael B. Maccarone. Quarterly progress rept. no. 2, 1 Dec 54-28 Feb 55, on Shaft Seal, Rotary, Contract DA 36-039-sc-64476. [1955] 46p. AD-69 747.

DESCRIPTORS: *Antennas, *Waveguides, Coaxial cables, Joints, Seals, *Rotary seals, Design, Tests, *Magnetic materials, Oils, *Silicones, Particles, Carbonyl radicals, Iron, Valves.

The experimental seal has been completed and has been put through preliminary mechanical run in tests. The tests showed the unit mechanically sound. New mechanical valves used for mechanically sealing of the experimental seal unit have been designed and constructed. The Test Assembly TS-1B received from the Signal Corps has been reassembled and electrically powered. Various components of the unit have been given preliminary mechanical and electrical operating tests. Some components of the unit were not in usable operating condition. Various components which are usable are being adapted to work in conjunction with a simple test stand assembly which is being constructed specifically for magnetically sealed rotary joint testing. Basic research work concerning magnetic fluid compositions has indicated that a silicone fluid seems the most promising to be used as the fluid constituent of the magnetic fluid in this investigation. Two types of carbonyl iron particles have been chosen for use in the initial test work. (See also PB 162 714)

PB 162 716 $4.60

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Michael B. Maccarone. Quarterly progress rept. no. 3, 1 Mar-31 May 55, on Shaft Seal, Rotary, Contract DA 36-039-sc-64476. [1955] 42p. AD-69 748.

DESCRIPTORS: *Antennas, *Waveguides, Coaxial cables, Joints, Seals, Brass, *Rotary seals, Design, Tests, *Magnetic materials, Magnets.

A basic design criteria is to be determined for pressurizing waveguide and coaxial rotary joints by using a previously established magnetic sealing principle. Results indicate that a magnetic seal could be made, but it could not fulfill the requirements of the development investigation. Development studies were then directed to a sealing system which involves a mechanical-type seal which utilizes a permanent magnet as one of its components. A seal is being constructed almost entirely of brass except for the permanent magnet, the stainless steel sealing surface, and the magnetic pole piece; sealing material will be a carbongraphite (Karbate) ring. (ASTIA abstract) (See also PB 162 715)

PB 162 779 $6.60

Nickel Cadmium Battery Corp., Easthampton, Mass.
INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 3, 15 Nov 56-14 Feb 57, on Studies on Sealed Nickel-Cadmium Cells, Contract DA 36-039-sc-72318 [continuation of Contract DA 36-039-sc-56728]. [1957] 64p. 31 refs. AD-147 064.

DESCRIPTORS: *Batteries and components, *Alkaline cells, Nickel, Cadmium, Design, Seals, Electrical properties, Tests, Voltage, Electric discharges, Electrolytes, Spectrographic analysis.

The principal design factors for sealed nickel-cadmium cells gleaned from a study of the literature, mainly patents, are based on the use of an excess of negative active material, a restriction in electrolyte volume to the free pore volume of electrodes and separator, the use of a porous separator capable of holding electrolyte by capillary action and resisting displacement by evolved gas and provision of gas diffusion paths to the negative electrode. The capacity of the Deac 150DK button cell is 35% above rated capacity at the 10-hour discharge rate (C/10) to a final discharge voltage of 1.10 volts per cell. Initial studies on a one-day continuous cycle test of the 150DK cell using 6 cycles with a 40-minute constant current discharge and a 60-minute modified constant voltage charge show promise for this abbreviated procedure for predicting performance. Continuous cycling of the Deac 150DK button cell over the first 839 cycles in a vacuum showed compliance with the required voltage conditions for the 40-60 minute cycle.

PB 162 778 $8.10

Nickel Cadmium Battery Corp., Easthampton, Mass.
INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 4, (Final), 15 Feb-14 May 57, on Studies on Sealed Nickel-Cadmium Cells, Separators and Modified BB403/U Cell Design, Contract DA 36-039-sc-72318. 15 June 57, 86p. 58 refs. AD-154 560.

DESCRIPTORS: *Batteries and components, *Alkaline cells, Nickel, Cadmium, Seals, Design, Electrical properties, Tests, Voltage, Electrical discharges, Electrodes, *Battery separators.

Discharge capacities and discharge-voltage curves on modified BB-403/U cells having 9-plate elements which were made up with thin sintered plates of 2.50, 2.75, and 3.0 in. in height were compared with the performance of BB-403/U cells consisting of standard elements with the same plate thickness and 4.25 in. in height. The cells with the 2.5 in. plates were borderline in behavior. The requirements were met by the cells that were subjected to trickle charge at 1.36 to 1.385 v/cell for 1 wk and discharged after open-circuit stands of less than 1 hr. Open-circuit stand of the modified BB-403/U experimental cells for 20 wk with the cells in the as-discharged condition following a 10-amp discharge showed increase in capacity on recharge; this effect was observed haphazardly with sintered plate cells. The separators, Polypore, Dupont Armalon (a KOH-impregnated microporous Teflon fabric), and a nonwoven nylon fiber paper, conferred discharge characteristics that were the same, within limits, as the nylon-cellophane separator when assembled in the 9-plate standard BB-403/U element. Deac 150 DK button-type sealed cells showed a life of 1800 c during which the final discharge voltage did not drop below 80% of the charging voltage. (ASTIA abstract) (See also PB 162 779)

PB 162 762 $10.10

RCA Defense Electronic Products, Camden, N. J.
DEVELOPMENT OF 455 KC ELECTROMECHANICAL FILTERS, by P. D. Gerber. Final rept. for 1 July 58-30 June 59 on Contract DA 36-039-sc-78128. [1959] 128p. AD-227 421.

DESCRIPTORS: *Band-pass filters, *Intermediate frequency filters, *Miniature electronic equipment, Design, Radiocommunication systems, Circuits, Transistors.

The design and development of a 455 kc torsional mode neck-coupled electromechanical filter is discussed. Basic design equations, including typical calculations, are given. Miniaturization to one cubic inch volumetric space of 5/8 x 11/16 x 2 5/16 inches was accomplished. Prototype filters using transistorized circuitry were evaluated against the desired performance characteristics of the technical requirements which include filter bandwidth, shape factor, temperature coefficient of frequency, temperature range, termination, shock and vibration, spurious responses, and low temperature storage. A total of 30 filter units were made. Twenty seven 455 kc filters were fabricated on the basis of prototype design evaluation, 2 as 300 kc lower sideband filters of current military specifications, and 1 as a 455 kc upper sideband filter. Performance data and curves are included and a bibliography of references on electromechanical filters and related subjects. A complete set of engineering sketches for the manufacture of these filters is included. (Author)

PB 162 710 $11.00

Sperry Gyroscope Co., Great Neck, N. Y.
BROADBAND MICROWAVE COMPONENTS. Annual engineering rept. 1 July-22 Aug 47, on Contract W-36-039-sc-32259. 22 Aug 47, 146p. Sperry engineering rept. no. 5224-1088; ATI-153 039.

DESCRIPTORS: *Microwave equipment, Broadband, *Antennas, Transmission lines, *Waveguide couplers, Flanges, Antenna chokes, Waveguide joints, *Waveguide slots, *Wavemeters, Design, Tests.

Included in this rept. are:
Broadband application of quarter wave sections of transmission lines
SWR and losses of a variable shorting bar
Measurement of SWR by resonance method
Moreno type crossed guide directional couplers
(See also PB 162 711)

PB 162 713 $3.60

Sperry Gyroscope Co., Great Neck, N. Y.
BROADBAND MICROWAVE COMPONENTS. Quarterly progress rept. no. 1 July-15 Sep 46, on Contract W36-039-sc-32259. [1946] 35p. Sperry engineering rept. no. 5224-1070; ATI-33 029

DESCRIPTORS: *Microwave equipment, Broadband, *Antennas, *Waveguide couplers, Flanges, Antenna chokes, Waveguide joints, *Transformers, Phase shifters, Design.

Some use has been made of RG-51/U,
1 1/4" x 5/8" x 0.064" waveguide over the rather narrow bandwidth of 12% and of RG-53/U.
1/2" x 1/4" x 0.040" waveguide over a bandwidth of only 2%. Work under the present contract will be concerned with the extension of the bandwidths of the waveguide components in these sizes of waveguides to bands of 40% or better.

PB 162 805 $4.60

Sperry Gyroscope Co., Great Neck, N. Y.
BROADBAND MICROWAVE COMPONENTS. Quarterly progress rept. no. 2, 15 Sep-15 Dec 46, on Contract W36-039-sc-32259. 15 Jan 47, 41p. Sperry engineering rept. no. 5224-1075; ATI-33 030.

DESCRIPTORS: *Microwave equipment, Broadband, *Antennas, *Waveguide couplers, Flanges, Antenna chokes, Waveguide joints, *Waveguide plungers, *Transformers, Design, Tests

Data observed on waveguide connectors, variable shorting bars, Moreno type directional couplers, and shaped fixed shorts are presented graphically. These data indicate the possibility of broadbanding choke-type waveguide connectors, and the broadband characteristics of which the Moreno type coupler is capable. Description is given of a variable shorting bar intended to achieve fixed shorting plane position relative to the face of the short. Possibilities are noted of broadbanding by shaped fixed shorts and other means. (Author) (See also PB 162 713)

PB 162 711 $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
BROADBAND MICROWAVE COMPONENTS. Quarterly progress rept. no. 3, 15 Dec 46-10 Apr 47, on Contract W-36-039-sc-32259. 25 April 47, 26p. Sperry engineering rept. no. 5224-1081; ATI-92 989.

DESCRIPTORS: *Microwave equipment, Broadband, *Antennas, *Waveguide connectors, Flanges, Antenna chokes, Waveguide joints, *Waveguide slots, Design, Tests.

Additional data is included in this report in order to round out the data on the effects of choke-type connector parameters, and on the measurement of narrow slots. Data observed on waveguide connectors and narrow slots are shown graphically. These data indicate the effects of varying the parameters of the waveguide coupler to obtain low reflections over the waveguide band, and the numerical values for transmission through narrow slots of the type used in Moreno and Schwinger couplers. (Author) (See also PB 162 805)

PB 162 660 $3.60

Stanford Electronics Labs., Stanford U., Calif.
THE INTERDIGITAL LINE AS A BACKWARD-WAVE STRUCTURE, by G. Wada. Rept. on Contract AF 33(600)27784. 25 Oct 56, 32p. 11 refs. Technical rept. no. 384-1; AD-114 077.

DESCRIPTORS: *Backward-wave oscillators, Oscillators, Circuits, Impedance, Frequency, Field theory, Electron tubes.

The results of analysis and experimental measurement of the properties of the thin - fingered interdigital line are presented with particular emphasis on the use of the structure in "O" and "M" type backward-wave oscillators. Because field analysis of the usual planar model of such a structure is difficult, a cylindrical model consisting of two interdigital lines in parallel wrapped on a cylindrical surface is studied. The results of the analysis and measurement are believed to be applicable to the planar model as long as the period is small compared with the circumference and the thickness of the fingers less than the width. A field analysis is presented which correctly predicts the high-frequency behavior of the structure. At low frequencies, the field analysis is in error because of an assumption regarding the phase variation along the slots. A low-frequency theory is presented which correctly gives the low-frequency dispersion. In addition, the backward-wave impedance is calculated using both the theoretical and experimentally determined dispersion curves. These impedances are compared with that of the bifilar helix and are found to differ from it by factors of two and less. (Author)

PB 162 661 $4.60

Stanford Electronics Labs., Stanford U., Calif.
AN INVESTIGATION OF AMPLIFICATION ALONG ELECTRON BEAMS UNDER CROSSED-FIELD CONDITIONS, by D. J. Harris and H. Heffner. Rept. on Contract AF 33(600)27784. 20 Nov 56, 43p. 7 refs. Technical rept. no. 385-1; AD-114 076.

DESCRIPTORS: *Electron beams, Electron tubes, Electron guns, *Amplifiers, Cavity resonators, Radiofrequency, Amplitude modulation, Electromagnetic fields.

This report describes an experimental investigation of the possible amplification of microwave signals along a flat strip beam moving between a pair of flat parallel conducting planes, under crossed electric and magnetic field conditions. An increase in the total amplification of a linear magnetron amplifier when a drift region was introduced midway along its length has been reported and various gain mechanisms postulated. In this study, the rate of growth of signal amplitude along a modulated strip beam has been measured directly by using an exploratory cavity, moving along the surface of the beam, to sample the r-f content as a function of position on the beam. A growing wave has been detected under these conditions, and the gain measured for various beam currents and degrees of modulation. For a beam current of 40 milliamperes/cm of beam width, a gain of 2 db/cm was obtained. This compares with a theoretically predicted gain of 3 db/cm. The possible practical application of this mechanism is breifly discussed. (Author)

PB 162 659 $9.60

Stanford Electronics Labs., Stanford U., Calif.
TRAVELING-WAVE AMPLIFIERS AND BACKWARD-WAVE OSCILLATORS AT VHF, by D. A. Dunn. Rept. on Contract AF 33(600)27784. 30 July 56, 116p. 31 refs. Technical rept. no. 310-1; AD-105 403.

DESCRIPTORS: *Traveling-wave tubes, Backward-wave tubes, *Backward-wave oscillators, Oscillators, Very high frequency, Frequency, Electron beams, Space charges, Configuration, Design, Amplifiers.

An important aspect of the design of traveling-wave amplifiers and backward-wave oscillators for frequencies below 500 Mc is the problem of obtaining a tube of reasonably small physical dimensions. Hollow beams of greater perveance than is obtainable with solid beams offer one method of reducing the size of such tubes by permitting operation at a lower voltage and power, than is possible in a solid beam tube. Some aspects of the design of minimum size hollow-beam forward-wave amplifiers using single helix circuits and backward-wave oscillators using both single and bifilar helix circuits are presented. Several tubes of these typed for operation below 500 Mc have been built. Amplifier bandwidths and oscillator tuning ranges in excess of four to one in frequency have been obtained experimentally. Amplifier efficiencies in excess of 20 per cent and oscillator efficiencies in excess of 10 per cent have been achieved. (Author)

Ordnance, Missiles, and Satellite Vehicles

PB 162 760 $16.00

Armour Research Foundation, Chicago, Ill.
RADAR-BEACON SYSTEM STUDY, by A. B. Aronson, A. T. Ashby and others. Final rept. for 15 Nov 56-14 Nov 59, on Contract DA 36-039-sc-73038. [1959] 246p. 12 refs. AD-237 253.

DESCRIPTORS: *Radar beacons, *Guided missiles, Test facilities, Airborne, Design, Guided missile tracking systems, Radar tracking, Radar equipment, Military requirements, Modulation.

The following topics are covered: I. General review and study of the over-all radar-beacon system, including reliable range of a radar beacon system, propagation effects, chain system operation and interference, coding tracking accuracy study, beacon delay variation, experimental evaluation of radar-beacon systems, and radio-tracking techniques. II. Optimum Radar-Beacon

System Parameters, including pulse width, bandwidth, delay variation, servo bandwidth, prf, maximum reply rate, peak power, antenna gain, atmospheric attenuation input power, S/N ratio, decoder tolerance, interference decoding rate, chain interference rate, fraction of missing pulses, tracking jitter, and threshold setting. III. Optimum Modulation Methods, including PAM, PPM, PDM, PFM, PCM, Binary, and Delta-modulation S/N ratio, distortion, crosstalk, multiplexing, effect on tracking accuracy, and proportional and on-off command. IV. Secure Radar-Beacon Flight Safety System, including system concept and analysis of operating characteristics, system testing, and flight tests at White Sands Missile Range. (Author)

NASA N63-12119 $2.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
RE-ENTRY AND RECOVERY OF FRAGMENTS OF SATELLITE 1960 €1 [SPUTNIK IV] by Charles A. Lundquist, Richard C. Vanderburgh and others. Rept. on Grant NsG-87-60. 21 Dec 62, 27p. refs. Special rept. no. 109.

NASA N63-10939 $14.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-17, VOLUME IV. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT. Rept. on Contract NAS7-100. 30 Oct 62, 208p. NP-12401.

NASA N63-12168 $8.10

Sperry Gyroscope Co., Great Neck, N. Y.
ROCKET ENGINE ANALYZER AND DECISION INSTRUMENTATION (READI) INVESTIGATION. VOLUME I - SUMMARY, BY E. S. Joline and others. Final rept., phase I, on Contract NAS8-4003. Dec 62, 81p. Report no. CA-4251-0160, vol. I.

NASA N63-12169 $15.00

Sperry Gyroscope Co., Great Neck, N. Y.
ROCKET ENGINE ANALYZER AND DECISION INSTRUMENTATION (READI) INVESTIGATION. VOLUME II - APPENDICES, by E. S. Joline and others. Final rept., phase I on Contract NAS8-4003. Dec 62, 226p. Rept. no. CA-4251-0160.

Sanitation and Safety Engineering

CEX-59.4.15 $1.00

Geological Survey, Washington, D. C.
AERORADIOACTIVITY SURVEY AND AREAL GEOLOGY OF THE OAK RIDGE NATIONAL LABORATORY AREA, TENNESSEE AND KENTUCKY (ARMS-1), by Robert G. Bates. Nov 62, 42p. 20 refs. Prepared in cooperation with Atomic Energy Commission. Div. of Biology and Medicine.

HW-74100 $1.25

Hanford Atomic Products Operation, Richland, Wash.
STUDIES IN RELIABILITY, I. THE ALGEBRA OF FOUR-STATE SAFETY DEVICE, by A. D. Wiggins. Rept. on Contract AT(45-1)-1350. Aug 62, 46p. NASA N62-16236.

TID-7635 $2.75

Johns Hopkins U., Baltimore, Md.
SHIPPING CONTAINER TESTING PROGRAM, ed. by James M. Morgan Jr., Arnold B. Joseph and others. Rept. of conference held at Johns Hopkins University May 2-3, 1962. Rept. on Contract AT(30-1)-1477. Aug 62, 153p.

SC-4733(M) $0.50

Sandia Corp., Albuquerque, N. Mex.
OPERATING MANUAL FOR THE SANDIA CLEAN BENCH, by R. C. Marsh and W. J. Whitfield. [Rept. on Contract AT(29-1)789]. Nov 62, 9p.

KY-423 $0.50

Union Carbide Nuclear Co., Paducah, Ky.
CONTINUOUS LEAK WATER SAMPLER, by K. K. Mitchell and R. C. Baker. Rept. on Contract W7405-eng-26. 30 Nov 62, 11p.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

PB 162 589 $3.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
DAMAGE SUSCEPTIBILITY. PHASE I: STUDY OF CAN DAMAGE, by Nov 58, 38p. 1 ref. Technical rept. no. 191; QMFCI Rept. no. 27-58; AD-209650.

DESCRIPTORS: Armed forces supplies, *Tin, *Containers, Impact shock, Shock (Mechanics), Statics, Tests, Deformation, Damage control, Mechanical properties.

Various types of tests were conducted to determine the effect of forces applied along the different axes of tin cans. Where possible, static and dynamic impact loadings were compared. Test facilities consisted of the Tinius Osen Compression Tester, Acme Drop Tester, Link Spring Tester (converted), Dynamic Denting rig (constructed), and Drop rig (constructed). Instrumentation to record dynamic test data consisted of a strain gage bridge-type accelerometer feeding into a high-gain oscilloscope. Through simple calculation some of the data were converted from acceleration time to force-time relationships. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB 181 463 $1.00

Williams, Clyde, and Co., Columbus, Ohio.
MATERIALS FOR THE GAS-TURBINE AUTOMOBILE ENGINE, by R. E. Greenlee and A. E. Focke. Rept. on Contract CC 4757. [1962] 37p. 55 refs.

DESCRIPTORS: Gas generator engines, Internal combustion engines, *Gas turbines, Materials, *Heat resistant alloys, Alloys.

An evaluation of commercial applications.

MATERIALS

NASA N63-11519 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
HOMOGENEITY OF DIISOCYANATE-LINKED ELASTOMERS, by A. J. Havlik. Rept. on Contract NAS7-100. 15 Sep 62, 38p. 10 refs. Technical rept. no. 32-334.

UCRL-6997 $0.50

Lawrence Radiation Lab., U. of California, Livermore.
BIBLIOGRAPHY OF MATERIALS PLATING BY THERMAL DECOMPOSITION OF GASES OR VAPORS, by Charles P. Coughlen. Rept. on Contract W-7405-eng-48. 28 June 62, 9p. NASA N62-17478.

MATHEMATICS

NASA N63-12084 $1.60

Automatic Control Center, Purdue U., Lafayette, Ind.
NONLINEAR THEORY AND APPLICATION, by Rufus Oldenburger. Rept. on Grant NsG-28-59. 11p. 7 refs.

PB 162 766 $1.60

Cornell U., Ithaca, N. Y.
ON A CONJECTURE OF TEICHMULLER, by W. H. J. Fuchs. Rept. no. 43 on Contract AF 18(600)685. Feb 56, 15p. 5 refs. OSR-TN-55-418; AD-87 396.

DESCRIPTORS: *Complex variables, *Functions, *Series, Integration, Logarithms.

It is proved that for an entire function of order ρ $\sum(\delta(a))^{1/2} = O^{\rho 1/2}\log^{1/2}(\rho + e)$, where the summation is over the deficiencies of all $a \pm \infty$. (Author)

NASA N63-10166 $6.60

Rias, Inc., Baltimore, Md.
AXIOMATIC THEORY OF CONTROL SYSTEMS, by Emilio O. Roxin. Rept. on Contracts NASr-103 and AF 49(638)-382. Aug 62, 66p. 13 refs. Technical rept. no. 62-16.

NASA N63-11327 $1.10

Rias, Inc., Baltimore, Md.
DIFFERENTIAL INEQUALITIES AND EXTENSION OF LYAPUNOV'S METHOD, by V. Lakshmikantham. Rept. on Contracts NASr-103, AF 49(638)382, and DA 36-034-ORD-3514 RD. 1962, 10p. 9 refs.

NASA N63-11343 $1.10

Rias, Inc., Baltimore, Md.
LYAPUNOV FUNCTIONS FOR THE PROBLEM OF LUR'E IN AUTOMATIC CONTROL, by R. E. Kalman. Rept. on Contracts NASr-103, AF 49(638)382, and AF 33(657)8559. 1962, 9p. 10 refs.

NASA N63-11352 $1.10

Rias, Inc., Baltimore, Md.
NOTE ON A PROBLEM IN OPTIMAL NONLINEAR CONTROL, by W. M. Wonham. Rept. on Contract NASr-103. 1962, 9p. 4 refs.

PB 159 611 $2.60

RIAS, Inc., Baltimore, Md.
STABILITY AND CONTROL, by J. P. LaSalle. Rept. on Contracts AF 49(638)382 and DA 36-034-ORD-3514. Dec 61, 23p. 30 refs. Technical rept. 61-17; AFOSR-1936.

DESCRIPTORS: *Control systems, *Stabilization systems, Stability, Theory, Functions, *Linear systems, Nonlinear systems, Feedback, Differential equations, Bibliography.

Liapunov's theorems are discussed and the nature of the stabilities assured by the theorems. Some simple illustrations are given of the application of the Liapunov method and some linear and nonlinear control problems are considered.

Computing Devices

ANL-6319(Rev.) $1.25

Argonne National Lab., Ill
ENGINEERING APPLICATIONS OF ANALOG COMPUTERS, by Lawrence T. Bryant, Marion J. Janicke and others. Rept. on Contract W31-109-eng-38. Oct 62, 51p. 10 refs. NASA N63-10613.

PB 157 804-27 $3.60

Digital Systems Lab., Princeton U., N. J.
DERIVATION OF OPTIMUM TESTS SEQUENCES FOR SEQUENTIAL MACHINES, by J. F. Poage and E. J. McCluskey, Jr. June 62, 39p. 14 refs. Technical rept. no. 27.

DESCRIPTORS: *Digital systems, Computer logic, *Switching circuits, *Sequence switches, Tests, Models (Simulations), Tables.

A technique is presented for deriving the shortest sequence of input symbols which must be applied to a sequential machine to guarantee that no fault from a set $\{\mathcal{F}_p\}$ exists within the machine. Flow tables are used to describe the machine for which a test is desired as well as all defective machines into which it is transformed by the faults of $\{\mathcal{F}_p\}$. The set of flow tables is combined into a single composite table from which the optimum test sequence is found. Use of a composite table has the advantage that all possible sequences of input symbols need not be investigated. A large class of sequences which cannot possibly lead to an optimum test is easily recognized and discarded. (Author)

PB 157 804-29 $4.60

Digital Systems Lab., Princeton U., N. J.
FUNDAMENTAL MODE AND PULSE MODE SEQUENTIAL CIRCUITS, by E. J. McCluskey. Aug 62, 41p. 15 refs. Technical rept. no. 29.

DESCRIPTORS: *Switching circuits, Circuits, *Sequence switches, Feedback, Operation, *Digital systems, *Computer logic, Trigger circuits.

This paper presents a unified treatment of the two major modes of sequential circuit operation. Formal definitions are given for sequential circuit operation with level inputs (Huffman or relay type) and with pulse inputs (Moore or Mealy circuits, finite automata). The properties of these two modes of operation are discussed and compared. (Author)

PB 157 804-28 $3.60

Digital Systems Lab., Princeton U., N. J.
REDUCTION OF FEEDBACK LOOPS IN SEQUENTIAL CIRCUITS AND CARRY LEADS IN ITERATIVE NETWORKS, by E. J. McCluskey. Aug 62, 34p. 13 refs. Technical rept. no. 28.

DESCRIPTORS: *Digital systems, Computer logic, *Switching circuits, *Sequence switches, Design, Feedback, *Algorithms, Tables.

Techniques are presented for making use of "previous" inputs and outputs in designing sequential circuits and iterative networks. Theorems are proved regarding the maximum reduction in feedback loops or carry leads which can be obtained by the use of such techniques. An algorithm for testing whether a given state table corresponds to a definite event results as a by-product of the more general techniques presented here. (Author)

PB 157 804-30 $5.60

Digital Systems Lab., Princeton U., N. J.
A REGISTER TRANSFER LANGUAGE TO DESCRIBE DIGITAL SYSTEMS, by Herbert Schorr. Sep 62, 57p. 10 refs. Technical rept. no. 30.

DESCRIPTORS: *Digital systems, Data processing systems, *Programming languages, Arithmetic operations, Operation, Computer logic, Programming (Computers), Digital computers.

A language is presented that can be used to describe the processing of information in a digital system. This processing involves the execution of some basic operations upon the information as it is transferred from register to register. Thus, the language describes registers, parts of registers, and introduces symbols to represent the basic operations such as addition, subtraction, shifting, indirect addressing, etc., used in digital systems. The language developed is suitable for designing and analyzing a digital system since the language is compact and can be used to describe the step by step execution of an instruction. (Author)

PB 157 804-19 $4.60

Digital Systems Lab., Princeton U., N. J.
SEQUENTIAL CIRCUIT SYNTHESIS USING HAZARDS AND DELAYS, by E. B. Eichelberger. June 62, 57p. 15 refs. Technical rept. no. 19.

DESCRIPTORS: *Digital systems, Computer logic, *Sequence switches, *Switching circuits, Synthesis, Feedback, Trigger circuits, Counting methods, Memory devices, Models (Simulations), Tables.

This paper describes a new method of realizing sequential circuits characterized by level input signals and level output signals. This method leads to circuits containing delays on the inputs as well as in the feedback loops. The input delays are combined with static hazards to produce pulses which are used in changing the internal state of the circuit. A new model is proposed for this type of circuit, and a new flow table called a compressed flow table is used to describe it. A compressed flow table has the same form as a primitive flow table thus enabling the state minimization problem to be solved using primitive flow tables. (Author)

ORNL-3318 $1.25

Oak Ridge National Lab., Tenn.
COMPUTER PROGRAMS USING ZONAL HARMONICS FOR MAGNETIC PROPERTIES OF CURRENT SYSTEMS WITH SPECIAL REFERENCE TO THE IBM 7090, by M. W. Garrett. Rept. on Contract W7405-eng-26. [1960] 44p. 8 refs. NASA N63-10657.

MECHANICS

NASA N63-11856 $3.60

Aerojet-General Corp., Azusa, Calif.
STUDY ON BELL-MODE VIBRATIONS OF CONICAL NOZZLES, by D. Platus. Quarterly contract status rept. no. 2, 16 Aug-15 Nov 62, on Contract NASr-111. Nov 62, 39p. 4 refs. Rept. no. 0660-01-2.

NASA N63-10990 $3.60

Catholic U. of America, Washington, D. C.
FREE TRANSVERSE VIBRATIONS IN AN INFINITELY-LONG, LAYERED ELASTIC CYLINDER, by J. H. Baltrukonis, Michael Chi, and W. G. Gottenberg. Technical rept. no. 3, on Grant NsG 125-61, suppl. 1-62. Aug 62, 33p. 8 refs.

AD-264 123 $5.60

Florida U. Engineering and Industrial Experiment Station, Gainesville.
EXPERIMENTAL DETERMINATION OF A STATISTICAL REPRESENTATION OF THE NOISE FIELD OF A SUBSONIC AIR JET, by Marc R. P. Trubert, Harold G. Kizner, and William A. Nash. Technical note no. 3 on Contract AF 49(638)328. Aug 61, 59p. 16 refs. AFOSR-991.

DESCRIPTORS: *Jets, Noise, Measurement, Statistical analysis, *Nozzles, *Subsonic flow, Pressure, Differential equations, Partial differential equations, Statistical functions, Test methods, Correlation techniques.

A space-time investigation of the noise field created by a subsonic air jet has been carried out experimentally with a model nozzle 1.4 inches in diameter. The random-noise pressure of the jet has been measured at the surface of a rigid plate placed outside the jet boundary. The cross correlation of the random noise has been chosen to represent the statistical properties of the noise field. A set of cross-correlation curves has been obtained experimentally. This investigation presents statistical representations of pressures in an obstructed field, whereas previous studies have pertained only to free fields. (Author)

AD-265 271 $4.60

Polytechnic Inst. of Brooklyn, N. Y.
DAMPING OF FLEXURAL VIBRATIONS OF SANDWICH PLATES, by Yi-Yuan Yu. Technical note no. 10 on Contract AF 49(638)453. May 61, 49p. 8 refs. AFOSR-838.

DESCRIPTORS: *Damping, *Vibration, *Sandwich panels, Structures, Thickness, Shear stresses, Stresses, Deformation, Density, Elasticity, Theory, Mathematical analysis, Equations, Boundary layer.

For the analysis of the effect of structural damping on the flexural vibrations of infinite and simply supported rectangular sandwich plates, the general two-dimensiona equations of a sandwich-plate theory are first presented. As in the one-dimensional case, the theory takes into account the thickness-shear deformation and imposes no limitations upon the ratios between the densities, elastic moduli, and thicknesses of the core and face layers of the sandwich. The unrestricted nature of the theory makes a thorough analysis of damping possible, and the results obtained are in fact applicable to any symmetrically constructed three-layered composite plate. The concept of "Damping Parameter" is introduced. (Author)

PB 162 785 $5.60

Polytechnic Inst. of Brooklyn, N. Y.
STRESS DISTRIBUTION IN A CIRCULAR CYLINDRICAL SHELL UNDER HYDROSTATIC PRESSURE SUPPORTED BY EQUALLY SPACED CIRCULAR RING FRAMES. PART I: THEORY, by V. L. Salerno and John G. Pulos. Rept. on Contract N6onr-26303. June 51, 54p. 3 refs. PIBAL rept. no. 171-A; ATI-125 134.

DESCRIPTORS: *Cylindrical bodies, *Structural shells, *Stresses, Hydrostatic pressure, Pressure, Load distribution, Deflection, Elasticity, Theory.

The formulae of von Sanden and Gunther for the stresses caused by hydrostatic pressure in a circular cylindrical shell supported by uniformly spaced circular rings of constant cross section have been rederived to include properly the effect of the axial load and the boundary condition of Viterbo. The main results of the investigation are relations which replace the previous formulae. (Author)

PB 158 424 $5.60

Princeton U., N. J.
A GRAPHITE RESISTANCE HEATER FOR A HYPERSONIC WIND TUNNEL USING NITROGEN, by R. P. Shreeve, W. T. Lord and others. Rept. on Contract AF 49(638)709. June 61, 54p. 25 refs. Rept. 560; AFOSR-1028.

DESCRIPTORS: *Hypersonic wind tunnels, Wind tunnels, *Heaters, Graphite, Coatings, Heating elements, Nitrogen, Thermodynamics.

A thin impermeable coating of pyrolytic graphite over the outside of the heater element has prevented the formation of holes in the outer wall, which occurred earlier using uncoated elements. Such coated elements have regularly been used to provide steady gas temperatures up to 5000°R. at 1000 psia pressure. An analysis of the heater performance using an energy balance has yielded an empirical formula, in non-dimensional form, which describes the performance of the heater system over its present range of use. The present unit has application also in the heating of other gases.

PB 158 423 $9.10

Princeton U., N. J.
A STUDY OF THE EQUATION $\varphi_{xxx} - \varphi_x \varphi_{xx} + \varphi_{YY} = 0$ WHICH DESCRIBES THE STRUCTURE OF WEAK NON-HUGONIOT SHOCK WAVES, by Martin Sichel. Rept. on Contract AF 49(638)465. Mar 61, 106p. 19 refs. Rept. 541; AFOSR-1166.

DESCRIPTORS: *Shock waves, Propagation, Aerodynamics, Transonic flow, Viscosity, Boundary layer, Perturbation theory, *Partial differential equations, Integration, Integral equations, Potential theory.

This equation, which arose in the study of the leading edge of the boundary layer induced by a shock wave moving past a flat plate, provides a mathematical description of the two dimensional structure of weak non-Hugoniot shock waves. In such shock waves variations tangential to the shock wave are important so that the structure is no longer one dimensional. The Viscous-Transonic equation is used to develop an equation for the perturbation to the structure of a weak normal shock wave due to a small disturbance within the shock wave. Uniqueness proofs for a finite domain are developed for both the Viscous-Transonic and Perturbation equations. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

NASA N63-10530 $5.60

Heat Transfer and Fluid Mechanics Lab., U. of Michigan, Ann Arbor.
OBSERVATIONS OF CAVITATION SCALE AND THERMODYNAMIC EFFECTS IN STATIONARY AND ROTATING COMPONENTS WITH WATER AND MERCURY, by F. G. Hammitt, R. D. Ivany, and others. Technical rept. no. 6, on Grant NsG-39-60. Sept. 62, 54p. 22 refs. Rept. no. 03424-6-T.

NASA N63-10998 $2.60

Hydronautics, Inc., Laurel, Md.
CAVITATION DAMAGE IN LIQUID METALS, by Phillip Eisenberg. Progress rept. 2 Aug-2 Oct 62, on Contract NASr-105. 1962, 21p. 3 refs. Progress rept. no. 235-2.

PB 162 754 $2.60

Hydronautics, Inc. [Laurel] Md.
OPTIMUM WING-STRUT SYSTEMS FOR HIGH SPEED OPERATION NEAR A FREE SURFACE, by C. F. Chen. Rept. on Contract NObs-78396. 24 June 60, 25p. 6 refs. Technical rept. 001-1; AD-248 902.

DESCRIPTORS: *Hydrofoils, *Hydrodynamics, Load distribution, Lift, Stability, Drag, Deformation, Moments, Stresses, Design.

The minimum induced drag of strut supported three dimensional hydrofoil systems operating at high Froude number and arbitrary depth beneath a free surface is calculated and the results are presented graphically; these systems include a one strut configuration and four double strut configurations. The maximum bending moments on the hydrofoils in these systems are calculated and simple approximate formulae for these moments are given. Comparison is finally made of these systems on the basis of the same wing area, lift coefficient, and maximum bending stress. Strength considerations outweigh the hydrodynamic considerations for aspect ratios greater than 1.5; the best system for such aspect ratios is that of an elliptically loaded wing with two struts spaced such that the wing bending moment is a minimum; when the struts are pin-jointed to the wings and the wings are rectangular, this optimum spacing results in wing overhangs of approximately 25%. For low aspect ratio wings (less than 1.5) optimum systems may involve more outboard placement, and side-loading of the supporting strut. (Author)

NASA N63-12153 $3.60

Purdue U. School of Mechanical-Engineering, Lafayette, Ind.
DYNAMIC RESPONSE OF FLUID LINES, by A. F. D'Souza and R. Oldenburger. Rept. on Grant NsG-28-59. 1962, 40p. 15 refs.

METALLURGY

ANL-6460 $0.50

Argonne National Lab., Ill.
ROOM-TEMPERATURE LATTICE CONSTANTS OF ALPHA URANIUM-PLUTONIUM ALLOYS, by A. F. Berndt. Rept. on Contract W31-109-eng-38. Oct 62, 25p. 18 refs.

NASA N63-10289 $1.60

Denver Research Inst., Colo.
RESEARCH ON THE EFFECT OF SELECTED RARE-EARTH SCAVENGERS ON THE PROPERTIES OF TUNGSTEN AND MOLYBDENUM, by C. Samuel Miller and Donald T. Klodt. Quarterly progress rept. no. 3, 1 Aug-31 Oct 62, on Grant NsG 61-60, suppl. 3-63. Nov 62, 17p. DRI no. 2068.

SEP-260 $0.50

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
FUNDAMENTALS OF DIFFUSIONAL BONDING. PART VII, by L. S. Castleman, H. A. Froot, and L. Seigle. Annual progress rept. no. 7, 1 July 61-30 June 62, on Contract AT(30-1)2102. 30 June 62, 25p. TR-62-451.2. 15 refs. [TR-62-451.2]

HW-75120 $0.50

Hanford Atomic Products Operation, Richland, Wash.
ELECTRICAL PROPERTIES OF PLUTONIUM OXIDES, by C. E. McNeilly. Rept. on Contract AT(45-1)1350. Sep 62, 15p. 5 refs.

TID-8212 $1.00

Rolla Metallurgy Research Center, Bureau of Mines, Mo.
USE OF DEPLETED URANIUM IN BEARING METALS AND LOW-ALLOY STEELS. Final metallurgical rept. 1 Apr 59-30 June 62. Nov 62, 42p. 10 refs. NASA N63-10659.

Ferrous Metals

PB 181 427 $2.25

Committee on Ship Structure, National Research Council, Washington, D. C.
THE EFFECT OF METALLURGICAL VARIABLES IN SHIP-PLATE STEELS ON THE TRANSITION TEMPERATURES IN THE DROP-WEIGHT AND CHARPY V-NOTCH TESTS, by F. W. Boulger and W. R. Hansen (Battelle Memorial Inst.). Rept. on Contracts NObs-77113 and NObs-84321. 3 Dec 62, 82p. 17 refs. Serial no. SSC-145.

DESCRIPTORS: *Ship plates, Ship structural components, *Steel, Metallurgy, *Transition temperature, Temperature, Tensile properties, Tests, Sheets, *Metal plates.

Twenty-nine heats were produced and processed in the laboratory in order to study the effects of composition and ferrite grain size on drop-weight transition temperatures. The experimental steels covered the following ranges in composition: 0.10/0.32% carbon, 0.30/1.31% manganese, 0.02/0.43% silicon, and nil/0.136% acid soluble aluminum. The experimental data were used for a multiple correlation analysis conducted with the aid of an elec[illegible]computer. The study showed that carbon raises [illegible] manganese, silicon, aluminum and finer ferrite grain sizes lower both drop-weight and Charpy transition temperatures. Quantitatively, variations in composition and grain size have a more marked effect on V_{15} Charpy transition temperatures than on the drop-weight transition temperature. Useful correlations were found between transition temperatures in drop-weight tests and those defined by seven different criteria for Charpy tests. Evidence was accumulated that conditions ordinarily used for drop-weight tests are more severe for 1-1/4-in. thick plate than for 5/8-to 1-in. thick plate. (Author)

NASA N63-11053 $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TENSILE PROPERTIES OF FIVE LOW-ALLOY AND STAINLESS STEELS UNDER HIGH-HEATING-RATE AND CONSTANT-TEMPERATURE CONDITIONS, by W. W. Gerberich, H. E. Martens, and R. A. Boundy. Rept. on Contract NAS7-100. 1 June 62, 49p. 10 refs. Technical rept. no. 32-222.

UCRL-10415 $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
THE MECHANISM OF THE MARTENSITE BURST TRANSFORMATION IN SINGLE CRYSTALS OF IRON CONTAINING 31.7 PERCENT NICKEL, by Jack C. Bokros. Doctoral thesis. Rept. on Contract W7405-eng-48. 7 Sep 62, 57p. 33 refs.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

HW-75228 $1.50

Hanford Atomic Products Operation, Richland, Wash.
PHYSICS RESEARCH QUARTERLY REPORT, JULY-SEPTEMBER, 1962. Rept. on Contract AT(45-1)1350. 15 Oct 62, 54p. 5 refs.

HW-75428 $0.50

Hanford Atomic Products Operation, Richland, Wash.
RADIATION DAMAGE IN GRAPHITE BY HIGH ENERGY ELECTRONS, by I. T. Myers. Rept. on Contract AT(45-1)1350. 29 Oct 62, 10p. 12 refs.

UCRL-10429 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
ATOMIC CAPTURE OF μ - MESONS IN CHEMICAL COMPOUNDS AND THE "FERMI-TELLER Z LAW", by Jagdish S. Baijal. Thesis. Rept. on Contract W-7405-eng-48. 20 Aug 62, 73p. 32 refs.

UCRL-10474 $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
SPONTANEOUS FISSION OF THE HEAVIEST ELEMENTS, by Sven A. E. Johansson. Rept. on Contract W7405-eng-48. 25 Sep 62, 22p. 19 refs. NASA N63-10871.

ORNL-3320 $2.75

Oak Ridge National Lab., Tenn.
CHEMISTRY DIVISION ANNUAL PROGRESS REPORT. Rept. for period ending 20 June 62 on Contract W7405-eng-26. [1962] 149p. 210 refs.

ORNL-3334 $0.50

Oak Ridge National Lab., Tenn.
PRODUCTION OF TRITIUM BY CONTAINED NUCLEAR EXPLOSIONS IN SALT: I. LABORATORY STUDIES OF ISOTOPIC EXCHANGE OF TRITIUM IN THE HYDROGEN-WATER SYSTEM, by W. D. Bond. Rept. on Contract W7405-eng-26. [1960] 19p. 12 refs.

DP-511 $1.25

Savannah River Lab., Aiken, S. C.
TECHNIQUES FOR THE DETERMINATION OF TRITIUM, by M. S. Feldman. A literature search. Rept. on Contract AT(07-2)1. June 62, 56p. 8 refs. NASA N63-11236.

Elementary Particles

UCRL-10205 $1.25

Lawrence Radiation Lab., U. of California, Berkeley.
EXPERIMENTAL STUDY OF THE $K^+_{\mu 3}$ AND K^+_{e3} DECAY MODES OF THE K^+ MESON, by John L. Brown, John A. Kadyk and others. Rept. on Contract W-7405-eng-48. 20 Aug 62, 55p. 13 refs.

NASA N63-10484 $5.60

Yale U., New Haven, Conn.
EXPERIMENTAL LIMITS FOR THE ELECTRON-PROTON CHARGE DIFFERENCE AND FOR THE CHARGE OF THE NEUTRON, by Jens C. Zorn (Doctoral thesis), George E. Chamberlain, and Vernon W. Hughes. Rept. on Grant NsG-1-59. 1961, 52p. 36 refs.

Instruments and Installations

ANL-6628 $1.00

Argonne National Lab., Ill.
AUTOMATIC FOIL ACTIVITY COUNTING FACILITY AND DATA-REDUCTION PROGRAM, by K. E. Plumlee and M. T. Wiggins. Rept. on Contract W31-109-eng-38. Oct 62, 43p. 11 refs.

HW-75746 $1.00

Hanford Atomic Products Operation, Richland, Wash.
A DEVICE FOR RECORDING FUEL ELEMENT DIMENSIONS ON PUNCHED PAPER TAPE, by G. E. Driver. Rept. on Contract AT(45-1)1350. Dec 62, 34p.

UCRL-7032 $0.50

Lawrence Radiation Lab., U. of California, Livermore.
THE CERENKOV RESPONSE OF LUCITE AND QUARTZ TO GAMMA AND FAST NEUTRON RADIATION, by J. E. Doyle and W. C. Dickinson. Rept. on Contract W-7405-eng-48. 5 July 62, 28p. 7 refs. NASA N63-10115.

UCRL-7068 $1.00

Lawrence Radiation Lab., U. of California, Livermore.
He^3 GAS SCINTILLATION NEUTRON DETECTOR, by W. C. Dickinson and A. Lauzon. Rept. on Contract W7405-eng-48. 28 Sep 62, 41p. 20 refs.

AD-279 927 $1.60

Nuclear Defense Lab., Army Chemical Center, Md.
RECENT DEVELOPMENTS IN THE NEUTRON ACTIVATION THRESHOLD DETECTOR SYSTEM AS USED BY THE U. S. ARMY NUCLEAR DEFENSE LABORATORY, by John H. McNeilly and John W. Kinch. Oct 61, 20p. 2 refs. NDL-TR-15.

DESCRIPTORS: *Neutron spectrum, *Neutron flux, *Neutron detectors, *Uranium, *Magnesium, *Aluminum, Radiation counters, Calibration, Foils, Gold, Sulfur.

This report describes an experimental investigation of uranium-235, magnesium, and aluminum as activation-type neutron detectors and the calibration of recently installed automatic counting equipment used with the threshold detector system.

ORNL-3347 $2.75

Oak Ridge National Lab., Tenn.
HEALTH PHYSICS DIVISION ANNUAL PROGRESS REPORT. Rept. for period ending 31 July 62 on Contract W-7405-eng-26. [1962] 180p. 170 refs.

Nuclear Engineering and Power

ANL-6633 $2.75

Argonne National Lab., Ill.
CONTRIBUTION TO THE THEORY OF TWO-PHASE ONE-COMPONENT CRITICAL FLOW, by Hans K. Fauske. Rept. on Contract W31-109-eng-38. Oct 62, 175p. 107 refs. NASA N63-11025.

ANL-6629 $2.25

Argonne National Lab., Ill.
CORE A CRITICAL STUDIES FOR THE ENRICO FERMI ATOMIC POWER PLANT ON ZPR-III, by C. E. Branyan. Rept. on Contract W-31-109-eng-38. Oct 62, 110p. 20 refs.

ANL-6554 $0.50

Argonne National Lab., Ill.
INSTRUMENTED TEMPERATURE-CONTROLLED CAPSULES FOR IRRADIATIONS IN THE CP-5 REACTOR, by W. N. Beck and R. J. Fousek. Rept. on Contract W31-109-eng-38. Oct 62, 23p. 7 refs.

NAA-SR-7400 $6.00

Atomics International, Canoga Park, Calif.
ANNUAL TECHNICAL PROGRESS REPORT. AEC UNCLASSIFIED PROGRAMS, FISCAL YEAR 1962. Rept. on Contract AT(11-1)-GEN-8. 15 Nov 62, 428p.

BMI-1593(Del.) $2.00

Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING AUGUST, 1962, by Russell W. Dayton and Ronald F. Dickerson. Rept. on Contract W-7405-eng-92. 1 Sep 62, 68p.

DP-785 $0.50

du Pont de Nemours, E. I., and Co., Wilmington, Del.
HEAVY WATER MODERATED POWER REACTORS, comp. by R. R. Hood and L. Isakoff. Progress rept. Sep 62, on Contract AT(07-2)1. Oct 62, 23p. 50 refs.

PNE-115F $1.25

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
TIMING AND FIRING, by N. Hagopian and J. Kraemer. Rept. on Proj. GNOME, Contract [AT(29-1)1183.] Aug 62, 56p. 64 refs.

GA-2301 $1.25

General Atomic Div., General Dynamics Corp., San Diego, Calif.
DEVELOPMENT OF CARBON-COATING PROCESS FOR (Th, U)C_2 FUEL PARTICLES, by Glen B. Engle. Rept. on Contract AT(04-3)-314. 10 Oct 61, 53p. 5 refs.

GEMP-75 $1.00

General Electric Co., Cincinnati, Ohio.
REACTOR INSTRUMENTATION AND CONTROL. Progress rept. no. 75, on Contract AT(40-1)-2847. 30 Nov 62, 40p. 6 refs. NASA N63-10614.

HW-75052 $0.75

Hanford Atomic Products Operation, Richland, Wash.
POSTIRRADIATION EVALUATION OF ZIRCALOY-2 PRESSURE TUBE FROM KER-3, by R. C. Aungst. Preliminary rept. on Contract AT(45-1)-1350. 25 Sep 62, 30p. 2 refs.

HW-70980 $0.50

Hanford Atomic Products Operation, Richland, Wash.
RADIOISOTOPE CONCENTRATIONS IN THE PRTR PRIMARY COOLANT AND HELIUM SYSTEMS DURING OPERATION WITH A FAILED FUEL ELEMENT(S), by R. W. Perkins and C. W. Thomas. Rept. on Contract AT(45-1)1350. 7 Sep 61, 15p. 6 refs.

HW-74761 $3.50

Hanford Atomic Products Operation, Richland, Wash.
RESEARCH AND DEVELOPMENT PROGRAMS EXECUTED FOR THE DIVISION OF REACTOR DEVELOPMENT, ed. by W. A. Snyder and J. E. Brown. Quarterly progress rept. Apr-June 62, on Contract AT(45-1)-1350. 15 Nov 62, 264p. 56 refs.

K-1549 $0.50

Oak Ridge Gaseous Diffusion Plant, Tenn.
CONSTRUCTION OF ORIENTED FLOW DEVICES, by C. J. King and E. G. Farrier. Rept. on Contract W7405-eng-26. 7 Dec 62, 21p. 3 refs. NASA N63-11174.

K-1550 $0.50

Oak Ridge Gaseous Diffusion Plant, Tenn.
THE EFFECT OF URANIUM DENSITY ON THE SAFE U-235 ENRICHMENT CRITERION, by C. E. Newlon. Rept. on Contract W-7405-eng-26. 11 Oct 62, 21p. 15 refs.

ORNL-3369 $2.75

Oak Ridge National Lab., Tenn.
MOLTEN-SALT REACTOR PROGRAM. Semiannual progress rept. for period ending 31 Aug 62, on Contract W7405-eng-26. [1962] 155p. 51 refs.

ORNL-2752 $2.75

Oak Ridge National Lab., Tenn.
PRELIMINARY DESIGNS FOR FOUR INTEGRATED GAS-COOLED CERAMIC-FUELED AND -MODERATED REACTOR CORE AND STEAM GENERATOR UNITS, by A. P. Fraas. Rept. on Contract W7405-eng-26. [1961] 153p. 21 refs.

Nuclear Reactions

BNL-768(N-7) $0.50

Brookhaven National Lab., Upton, N. Y.
NEUTRON CROSS SECTION EVALUATION GROUP. NEWSLETTER NO. 7, OCTOBER 1962, by Sophie Moore. [Rept. on Contract AT(30-2)GEN-16] Nov 62, 13p.

UCRL-10378 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
DIFFERENTIAL CROSS SECTIONS FOR ELASTIC SCATTERING OF POSITIVE PI MESONS ON PROTONS IN THE ENERGY REGION 500 TO 1600 MeV, by Jerome A. Helland. Thesis. Rept. on Contract W7405-eng-48. 15 Aug 62, 91p. 17 refs.

UCRL-10461 $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
HIGH-ENERGY NUCLEAR REACTIONS OF NIOBIUM WITH INCIDENT PROTONS AND HELIUM IONS, by Ralph Garret Korteling. Doctoral thesis. Rept. on Contract W7405-eng-48. 10 Sep 62, 105p. 86 refs. NASA N63-10870.

Waste Disposal

ORNL-2971(Vol. 6) $3.50

Oak Ridge National Lab., Tenn.
BIBLIOGRAPHY ON NUCLEAR REACTOR FUEL REPROCESSING AND WASTE DISPOSAL. VOLUME 6. PROCESS CHEMISTRY AND ENGINEERING, by T. F. Connolly. Rept. on Contract W7405-eng-26. [1962] 285p.

ORNL-3370 $2.50

Oak Ridge National Lab., Tenn.
CLINCH RIVER STUDY, ed. by R. J. Morton. Status rept. no. 3, on Contract W7405-eng-26. [1962] 126p. 24 refs.

PHYSICS

IS-299 $0.75

Ames Lab., Iowa State U. of Science and Tech.
POSITRON ANNIHILATION IN SOLIDS, by A. R. Mackintosh. Rept. on Contract W7405-eng-82. Oct 62, 34p. 20 refs. NASA N63-10752.

IS-492 $1.00

Ames Lab., Iowa State U. of Science and Tech.
THERMAL DIFFUSIVITY MEASUREMENTS ON A FINITE DISK, by Paul Dean Maycock and G. C. Danielson. Rept. on Contract W7405-eng-82. June 62, 37p. 14 refs. NASA N63-10708.

ANL-6611 $0.50

Argonne National Lab., Ill.
BENDING-MAGNET AND QUADRUPOLE ABERRATIONS FOR PARAXIAL RAYS, by M. L. Good. Rept. on Contract W31-109-eng-38. Nov 62, 15p. NASA N63-11199

AD-271 538 $1.60

Bell Telephone Labs., Inc., Murray Hill, N. J.
OPTICAL MASER RESEARCH. Quarterly rept. no. 1, 15 July-15 Oct 61, on Contract DA 36-039-sc-87340. 15 Oct 61, 19p. 9 refs.

DESCRIPTORS: *Lasers, Light, Amplifiers, *Optical systems, Ruby, Infrared radiation, Masers.

Research on optical masers and on the exploration of possible optical maser devices are the principal objectives. Work on the design, construction, and testing of a nonreciprocal Traveling-Wave Optical Maser Amplifier (TWOM) resulted in the successful operation of a pulsed TWOM test section with a net gain of 12.2 db. Tests made on the pulsed TWOM test section has proven that a high gain (30-60 db) optical amplifier is feasible. The basic considerations relating to this device are the same as those of its corresponding microwave. In practice, however, it appears desirable to amplify a large number of spatial modes so that a slow wave structure appears unnecessary. (Author)

PB 162 753 $5.60

Diamond Ordnance Fuze Labs., Washington, D. C.
SERIES EXPANSIONS OF BESSEL-FUNCTION COMBINATIONS OCCURRING IN COAXIAL-TRANSMISSION-LINE THEORY, by William E. Ryan. 8 Nov 56, 53p. 10 refs. DOFL rept. TR-404; AD-217 133.

DESCRIPTORS: Coaxial cables, Transmission lines, *Electromagnetic waves, *Propagation, Theory, Applied mathematics, *Bessel functions, Series, *Taylor's series, Electromagnetism.

Combinations of Bessel functions that occur in the theory of electromagnetic-wave propagation in cylindrically symmetric regions are expanded in power series of one of the arguments. Equations are derived for the first four terms of each power series for functions of zero

and first orders. In most problems of electromagnetic theory these series converge rapidly so that close approximations of the Bessel- function combinations are given by the first terms of the series; thus, a transcendental function is replaced by a polynominal. (Author)

AD-279 681 $8.10

Institute of Mathematical Sciences, New York U., N. Y.
STOCHASTIC MODELS FOR MANY-BODY SYSTEMS: II. FINITE SYSTEMS AND STATISTICAL NON-EQUILIBRIUM, by Robert H. Kraichnan. Rept. on Contract AF 49(638)341. Aug 61, 90p. 8 refs. Research rept. no. HT-10; AFOSR-1138; NASA N62-12565.

DESCRIPTORS: *Quantum mechanics, *Quantum statistics, *N-body problem, Fermions, Bosons, Green's function.

NASA N63-11325 $1.60

Lessells and Associates, Inc., Boston, Mass.
ACOUSTIC EMISSION UNDER CYCLIC STRESS. Rept. no. 3 on Contract NASr-97. 1 Dec 62, 13p. 2 refs.

AD-263 265 $1.60

Michigan State U., East Lansing.
PROPERTIES OF LOW-LYING NUCLEAR ENERGY LEVELS, by G. B. Beard and W. H. Kelly. Final rept. on Contract AF 49(638)10. [1961] 14p. 14 refs. AFOSR-867.

DESCRIPTORS: *Nuclear energy levels, Radioactive decay, *Radioactive isotopes, Magnetic fields, Nuclei, Iron, Spinel, Crystals, Temperature, Luminescence, Calcium compounds, Cadmium compounds, Tungstates.

Results obtained in experimental studies of certain properties of low-lying nuclear energy levels are summarized. Work on the decay schemes of several of the naturally radioactive isotopes is briefly described. Experiments to study magnetic fields at iron nuclei in spinel type crystals and to study temperature dependent luminescence in $CaWO_4$ and $CdWO_4$ crystals are summarized. Publications are listed and reprints, where available, are attached. (Author)
(Physics, 20 Apr 63)

AD-263 311 $1.60

Michigan State U., East Lansing.
"SELF-SCINTILLATION" STUDY OF THE BETA DECAY OF Rb^{87}, by G. B. Beard (Wayne State U.) and W. H. Kelly. Rept. on Contract AF 49(638)10. [1961] 15p. 24 refs. AFOSR-869.

DESCRIPTORS: *Rubidium, Isotopes, *Radioactive decay, *Beta decay, Spectrographic analysis, Beta ray spectrum, Luminescence.

The beta decay of Rb^{87} has been studied using the self-scintillations produced in three NaI(Tl) crystals doped with rubidium. The beta spectrum was measured down to 5 - 8 kev. An end point energy of 274 ± 3 kev and a specific activity equal to 780 ± 14 cps per gram of natural rubidium were found. Assuming an isotopic abundance of 27.85% for Rb^{87}, a half-life of $5.53 \pm 0.10 \times 10^{10}$ years is obtained. (Author)

AD-263 312 $1.60

Michigan State U., East Lansing.
TEMPERATURE DEPENDENT LUMINESCENCE OF $CaWO_4$ AND $CdWO_4$, by G. B. Beard (Wayne State U.), W. H. Kelly, and M. L. Mallory. [Rept. on Contract AF 49(638)10]. [1961] 16p. 9 refs. AFOSR-870.

DESCRIPTORS: *Alpha particles, *Calcium compounds, *Cadmium compounds, Tungstates, Temperature, Luminescence.

The relative efficiencies and decay times of alpha particle induced scintillations of $CaWO_4$ and $CdWO_4$ were investigated as a function of temperature in the range $10^{\circ}K$ to $375^{\circ}K$. Their behavior at intermediate and high temperatures is in agreement with that expected from the Mott-Seitz-Kröger configurational coordinate model. Values of E_Q, thermal quenching energy, of 0.34 and 0.31 ev were found for $CaWO_4$ and $CdWO_4$, respectively. As the temperature was decreased below $60^{\circ}K$, an increase in the decay times and a decrease in the relative efficiences were found. This behavior can be explained qualitatively by assuming the existence of a trapping level. (Author)

ORNL-3090 $0.50

Oak Ridge National Lab., Tenn.
PULSE HEIGHT CALCULATIONS FOR A PARALLEL PLATE IONIZATION CHAMBER CONTAINING ELECTRON ATTACHING GASES, by H. B. Eldridge. Rept. on Contract W7405-eng-26. [1962] 22p. 3 refs. NASA N63-10587.

Electronics

PB 162 701 $3.60

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME V: PHASE II, FAILED-COMPONENT ANALYSIS, by D. E. Filsinger, H. L. Floyd and others. Final rept. 30 Apr 56-31 Mar 58, on Subcontract to Contract AF 04(645)20. 15 Apr 58, 40p. 1 ref. Document no. 62-05-5610.

DESCRIPTORS: *Digital computers, *Electronic equipment, Reliability, *Diodes, Germanium, Life expectancy, Statistical tests, Statistical data, Simulation, *Reliability

This volume will be useful to those individuals desiring to know the types of failures that were encountered in the

operation of Remington Rand Univac ground-based computer systems and in the simulated-use life tests. This volume also discusses the probable causes for the failures and, where applicable, their relation to manufacturing problems. (Author)

PB 162 700 $10.50

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME VI: PHASE III, THE DEVELOPMENT OF COMPONENT-SCREENING TECHNIQUES, by J. E. Drennan, W. E. Chapin and others. Final rept. 30 Apr 56-31 Mar 58, on Subcontract to Contract AF 04(645)20. 31 Mar 58, 140p. 5 refs. Document no. 62-05-5611.

DESCRIPTORS: *Digital computers, Computers, *Electronic equipment, Reliability, Transistors, Resistors, Diodes, Life expectancy, Tests, Temperature, Operation, *Reliability.

This report describes a research program directed toward the development of techniques for detecting inherently weak transistors, diodes, and resistors before they are used in the computer system. The results of this research have indicated that screening techniques based on initial parameter measurements are feasible. Trial applications of the techniques on data from exploratory and simulated-use life tests indicate that it may be possible to classify correctly as many as 80 per cent of the components destined for early failure in use. (Author) (See also PB 162 701)

UCRL-6879 $2.50

Lawrence Radiation Lab., U. of California, Livermore.
PLASMA DYNAMICS, by S. A. Zwick. Rept. on Contract W7405-eng-48. Apr 62, 137p. 10 refs.
NASA N63-10500.

NASA N63-11431 $1.10

Michigan U., Ann Arbor.
AN INTEGRAL EQUATION OCCURRING IN PLASMA OSCILLATIONS, by R. S. B. Ong. Rept. on Grant NsG-22-59. 1962, 7p. 3 refs.

PB 149 565 $11.00

Stanford Electronics Labs., Stanford U., Calif.
PERIODIC MAGNETIC DEFLECTION FOCUSING OF SHEET ELECTRON BEAMS, by V. W. Dryden. Tropical rept. on Contract DA 36-039-sc-73178. Apr 60, 141p. 16 refs. M.L. rept. no. 708; S.E.L. Technical rept. no. 352-2; AD-241 164.

DESCRIPTORS: *Electron beams, *Magnetic fields, Deflection, Microwave equipment, Focusing.

The experimental work reported here proved the feasibility of periodic magnetic deflection focusing as originated by P. A. Sturrock (M. L. Rept. No. 595). Theoretical treatment begins with a hollow cylindrical system which is thin compared to the mean radius, but for calculation the planar approximation is shown to be sufficiently accurate. The calculations of Davis (M. L. Report No. 570) for a model with sinusoidal variation in deflecting field are extended to cases having an average value of deflection. Theoretical results for this model are compared with those of the Sturrock model which had rectangular variation of deflecting field. The relative importance of thermal velocity distribution and space-charge forces are considered. The parameters determining perveance capability and stability are discussed and optimum conditions presented. The hollow cylindrical experimental system is described in detail and experimental results are presented which confirm the theoretical work qualitatively and to a certain extent quantitatively. (Author)

PB 158 786 $9.10

Stevens Inst. of Tech., Hoboken, N. J.
GENERAL AREA OF PLASMA DYNAMICS IN MAGNETIC FIELDS, by Winston H. Bostick. Final rept. on Contracts AF 49(638)156, AT(30-1)1921, and AF 19(604)4086. Jan 61, 101p. 33 refs. Rept. no. SIT-F30(1/61); AFOSR-55.

DESCRIPTORS: *Plasma physics, *Magnetic fields, Propulsion, Electric propulsion. *Plasma engines, Ions, Density, Hall effect, Stability, Fluid dynamics, Temperature.

Contents:
Plasma motors: The propulsion of plasma by magnetic means, pub. in Proceedings of IXth International Astronautical Congress, Amsterdam, 1958, pp. 796-808
Experimental studies on plasma dynamics. Measurement of mass of plasma, iondensity, resistivity, and Hall electric field
A high efficiency plasma motor
Observation of apparent flute-type plasma instability, pub. in The Physics of Fluids, 1960, v. 3, no. 3
Experimental study of high-temperature plasma expanding perpendicular to a magnetic field and the resulting Rayleigh-Taylor instability
Behavior of plasmoids in a magnetic field in a vacuum.

Molecular Physics and Spectroscopy

NASA N63-12352 $2.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
A SUBMILLIMETER INTERFERENCE SPECTROMETER, by W. K. Rivers, Jr. and M. S. Spiel. Rept. on Grant NsG-258-62. 1963, 25p. 6 refs.

Presented at the Millimeter and Submillimeter Conference, Orlando, Fla., 7-10 Jan 63.

UCRL-10460 $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
CONFIGURATION INTERACTION IN THE RARE EARTHS AND ITS EFFECT ON THE STARK LEVELS OF $PrCl_3$ AND $GdCl_3 \cdot 6H_2O$, by Katheryn Edmonds Rajnak. Doctoral thesis. Rept. on Contract W7405-eng-48. Nov 62, 118p. 51 refs.

UCRL-10482 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
A MOLECULAR-BEAM ELECTRIC-RESONANCE SPECTROMETER AND THE RADIO-FREQUENCY SPECTRA OF LITHIUM FLUORIDE, by Alvin Joseph Hebert. Doctoral thesis. Rept. on Contract W7405-eng-48. 26 Sep 62, 86p. 46 refs. NASA N63-10872.

UCRL-10477 $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
ON THE MEASUREMENTS OF LIFETIMES, EXCITATION FUNCTIONS, DENSITIES, TOTAL CROSS SECTIONS, AND POLARIZATION RATIOS OF THE METASTABLE STATE OF THE NEON ATOM UNDER ELECTRONIC IMPACT, by Tetsuo Hadeishi. Thesis. Rept. on Contract W7405-eng-48. 25 Sep 62, 101p. 33 refs. NASA N63-10504.

Solid State Physics

PB 158 430 $2.60

Illinois U., Urbana.
FINE STRUCTURE IN THE ABSORPTION EDGE OF THE SILVER HALIDES, by F. C. Brown, T. Masumi, and H. H. Tippins. Technical note no. 6 on Contract AF 49(638)579. Aug 61, 21p. 26 refs. AFOSR-1392.

DESCRIPTORS: Crystals, *Silver compounds, *Halides, Chlorides, Bromides, Optical properties, Absorption spectrum, Line spectrum, *Photoconductivity, Photons.

The results of new optical absorption measurements on pure AgCl and AgBr will be reported and compared with the wavelength dependence of photoconductivity in these materials. Detailed structure consisting of low level absorption-tails and several shoulders has been found at various temperatures down to 4.2°K. The data will be analyzed in terms of indirect optical transitions together with a plausible band structure and vibration spectrum. (Author)

PB 158 431 $1.60

Illinois U., Urbana.
RECOMBINATION OF ELECTRONS AND DONORS IN SEMICONDUCTORS, by G. Ascarelli and S. Rodriguez (Purdue U.). Technical note no. 7 on Contract AF 49(638)579. Aug 61, 19p. 10 refs. AFOSR-1393.

DESCRIPTORS: *Semiconductors, Germanium, Electrons, Electrical conductance, *Impurities, Arsenic, Antimony, Phonons.

A description is given of a calculation of the recombination of electrons in the conduction band of a semiconductor with ionized donor impurities. The process which is assumed consists in the initial capture of the electron in an excited state of the donor center followed by a transition to the ground state. This mechanism is most effective in the case in which all transitions are accompanied with emission or absorption of phonons. The results obtained are compared with earlier theoretical calculations and with experiments. The agreement between the present theory and experiment is reasonably good. (Author)

ORNL-3364 $3.00

Oak Ridge National Lab., Tenn.
SOLID STATE DIVISION ANNUAL PROGRESS REPORT AND KEY WORD INDEX. Rept. for period ending 31 Aug 62 on Contract W7405-eng-26. [1962] 252p. 70 refs.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 162 653 $9.10

Wayne State U., Detroit, Mich.
SUMMARY OF THE PROCEEDINGS OF THE CONFERENCE OF FEDERALLY SPONSORED MACHINE TRANSLATION GROUPS ON MT-ORIENTED SYNTACTIC ANALYSIS HELD UNDER THE AUSPICES OF WAYNE STATE UNIVERSITY AT PRINCETON, NEW JERSEY JUNE 13-15, 1962, by Harry H. Josselson. [1962] 106p.

DESCRIPTORS: *Symposia, *Machine translation, *Language, Philology, Vocabulary.

Contents:
Parsing
Concord
Rection
Nesting
Relationship between morphology and syntax
Non-correspondence between parts of speech
Word order
Algorithmic and table lookup techniques
Special problems in languages other than russian
Models and theories.

MISCELLANEOUS

PB 181 411 OTS $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Mar 63.

DESCRIPTORS: *Naval research, *Scientific research, Radio astronomy, Lithium compounds, Aluminates, Steel, Fracture (Mechanics), Chemistry, Proteins, Surfaces, Infrared spectroscopy, Crystal structure, Vacuum systems, Pneumatic systems, Fire extinguishers, Powders, Mechanics, Tin, Non-destructive testing, Guns, Instrumentation, Transducers, Metallurgy, Ceramic materials, Diffusion, Niobium alloys, Titanium alloys, Iron alloys, Chromium alloys, Oxidation, Water vapor, Tellurium, Reactors, Furnaces, Electrodes, Melting, Nuclear physics, Resonance, Protons, Radio, Communication systems, Data transmission systems, Joints, Antennas, Guided missile antennas, Very low frequency, Radio signals, Circuits, Solid state physics, Potassium compounds, Chlorides, Bromides, Color centers, Scientific reports, Patents.

Contents:
Articles:
NRL Progress in Radio Astronomy (1961-1962), by E. F. McClain
NMR Determinations of Some Microscopic Parameters of a Lithium Aluminate, by G.H. Stauss

New Principles for Fracture-Safe Design os Steel Structures, by W. S. Pellini and P. P. Puzak

Scientific Program:

Chemistry: Structure and surface properties of protein monolayers. Solvent-induced effects on infrared spectra. A collection of Fortran programs for crystal structure analysis. A vacuum pneumatic process for filling dry chemical powder fire extinguishers

Mechanics: Ultrasonic methods for determining the elastic constants of tetragonal white tin. Instrumentation aids for the analysis of the NRL 3-inch light gas gun. Rotating multitransducer, used for ultrasonic detection of flaws in steel plate, yields eighteenfold reduction in total inspection time

Metallurgy and Ceramics: Diffusion data on the niobium-titanium alloy system. High-temperature oxidation of iron-chromium alloys in water vapor. The determination of tellurium in steel. In-reactor furnaces and associated control instrumentation. Preparation and properties of consumable electrode, vacuum arc-melted electrolytic iron. Technique for macro-replication of fractured sections

Nuclear and Atomic Physics: An investigation of the phenomenological characteristics of (p, γ) resonances

Radio: Multichannel communication and data transmission. Boom rotary joints for NRL's missile and space research radar antenna. Coincidence circuitry for monitoring vlf radio signals

Solid State Physics: Excited states of the F-center in KCl and KBr

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